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[OFFICIAL REPORT.]

FORTY-FOURTH MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

FIRST DAY—MORNING SESSION.

The Forty-fourth Annual Meeting of the New England Association of Gas Engineers was held at Young's Hotel, Boston, Wednesday and Thursday, February 18 and 19, 1914, under the Presidency of Mr. Thomas H. Hintze, of Providence, R. I., with Mr. N. W. Gifford, of East Boston, Mass., as Secretary.

The President having welcomed those present, and the reading of the minutes of the previous meeting having been dispensed with, the Secretary read the following

REPORT OF THE BOARD OF DIRECTORS.

Your Directors would report that they have examined and approved, and recommend to your consideration, the following papers:

"Notes on Vertical Settings in English Works," by C. A. Learned.

Lecture on "Ventilation," by Prof. S. H. Woodbridge, M.I.T.

"Chemical and Physical Properties of Lubricants," by Dr. J. F. Wing.

"Some Experience in Automobile Operation," by G. A. Smith, Jr.

Motion Pictures. "Ore to Finished Pipe," by F. N. Speller.

"Data on the Influence of Copper on the Corrosion of Iron and Steel," by E. R. Hamilton.

"Intensifying Output," by H. C. Crafts.

"Valuation of Street Mains and Services," by G. H. Priest.

They have received applications for membership, and their recommendations are as follows:

For election to

HONORARY MEMBERSHIP,

Addicks, W. R. Lamson, C. D. Nettleton, C. H.

For election to

ACTIVE MEMBERSHIP,

Hanke, E. E. Otten, C., Jr.
Harris, Alan, H., Jr. Price, W. H.

For transfer from

ASSOCIATE TO ACTIVE,

Taylor, H. G. White, H. E.

For election to

ASSOCIATE MEMBERSHIP,

Dow, F. N. Gardner, W. W.
Humphreys, R. H. McCormack, A. M.
Readio, J. H. Smart, B.
Wilber, L. M.

The Directors also recommend that the resignation of Messrs.

Bursley, W. H. Farrington, A. N.
Graf, C. Nutter, E. J.
Potter, T. J. Roberts, C. A.

be accepted.

On motion of Mr. Norcross the report was adopted as read.

ELECTION OF NEW MEMBERS.

On motion of Mr. C. A. Learned the Secretary was instructed to cast the ballot of the Association in favor of the election to membership of the gentlemen named. And Mr. Learned subsequently reported that the instruction had been followed. The President having introduced the new members, Vice-President Learned assumed the Chair, and President Hintze read the following

INAUGURAL ADDRESS.

The President's address before a representative body, such as that assembled in this place to-day, to my mind, should be a scholarly, dignified, well rendered resume of the past and present features of the business calling in which we are engaged; a horoscope of future growth and expansion, with recommendations that point to the further welfare of the Association. I am considerably handicapped in presenting to you such an address, so I hope you will be liberal in judgment and lenient in criticisms.

The New England Association of Gas Engineers was founded in this city of Boston, in the year 1871. Twenty-five of the sturdy New England type of men constituted its membership. They met as the first representative body of gas engineers in this country, and rightfully to us belongs the proud title of the Pioneer Association of Gas Engineers in America. They gathered together, as we to-day, to discuss the problems brought to them in the daily intercourse with the business in which they were engaged; also, seeking others' acquaintance, gaining in knowledge, at every step and turn, through the happy medium of an exchange of experiences and ideas. It has been handed down in traditional form that they had their troubles and trials as we of to-day have, with the exception though that it was dollars per thousand instead of cents, and meager thousands of cubic feet in daily output against millions. They have gone to their reward,

As a result of their labors we are benefited, and may we so labor and bring forth that those who come after us may be alike recompensed.

For about nine years the annual meetings were held in the old Tremont House, located on the site of the present Tremont Building. For 35 years, with the exception of perhaps two years, the annual meetings have been held in this very place. The Association has now attained a membership of nearly 250, and I am firmly convinced that the membership would have been materially increased had we more commodious quarters for our meetings. The Junior Past-President touched upon the matter in his address last year. A meeting of your Board of Directors was called last September, at which the subject of better accommodations was fully discussed. The prevailing opinion was that a change was necessary, but where a suitable place could be found was the stumbling block. However, a committee was appointed to visit different localities and report. At a meeting held in November this Committee reported inadvisable to make a change. I fully believe, before any change of meeting place for this Association can be made, this hotel will have to be entirely demolished.

This Association is prominent in the field. Its growth has been healthy, its future prospects are bright, and I would most earnestly impress on the members of the coming administration that their duty toward the Association is to foster its growth and prosperity by providing more commodious quarters for our meetings.

The gas industry of New England today is in a prosperous condition. There are instances where output has not increased in the usual percentage of former years; but, on the whole, there has been a gain, which shows a healthy state of affairs.

Conservatism has been applied as the leading characteristic of New England gas engineers. I would refute the statement. Go where you will, there may be found evidence in abundance to the contrary. Examples may be found of a most radical departure from well established lines, and the gas world today is watching and awaiting developments of construction and operation that are sure to add to the prestige of the New England gas engineer. Within a radius of 50 miles there may be seen examples of construction, and results from operation, nowhere else equalled, in many types of plants impossible to be found in any other country in the world within so small a territory.

Some years ago a well-known and popular manager of one of New England's best railroad systems was (in the parlance of the ministry) "called" to accept a similar position on a Western trunk line. After a trip over the road, through a wild and woolly country, he declined to accept, saying "Gentlemen, I was born and bred in New England; my home and friends are there; in fact, I consider New England the front yard of this country and my place is there." We are in business in the "front yard" of this country, hence it behooves us to show the rest of the country what can be accomplished.

Our German cousins and English brothers come to us with their wares and devices; but, gentlemen, no German cousins or English brothers can come to our country and expect their devices to operate as in their own land. Our coal and climate are different, and our workmen are of many nationalities, thus the foreign engineer, who can cast aside home practices and adapt his knowledge to conditions as he finds them here, is the one who succeeds. A plant from a new design may be likened unto a ship that was rocked and tossed, nearly wrecked, by waves and storms before she "found" herself. It might be added, too, that the captain's hair turned prematurely gray; so it may be in the installation of a new plant. Problems arise in its successful operation that do not appear in the specifications of the contract nor can they be seen on the blueprints for construction. Each has its own individuality, caused by the conditions which surround them and that which seems right and proper in one instance cannot be equally considered in another. The problems must be worked out and the future will show instances in New England how well it will be done.

The advance in the price of oil for gas making purposes has given an incentive to the manufacture of coal gas, and several plants are now in course of construction with others contemplated. I hope at the next annual meeting much information may be given regarding the construction and operation of these plants. I anticipate more installations of the vertical type and a fund of information should be available. In this connection, I would say that an impetus will be given in this country to the installation of the vertical retort system of the German type, and it will be well for champions of other types to look well to their laurels lest these be wrested from them.

There is much that can be said of firebrick material as manufactured in this country. According to experts, we have as good raw material as can be found; but, for various reasons, the finished product does not compare favorably with some imported brands. It was my good fortune, while abroad some 2 years ago, to visit a firebrick manufactory of world wide reputation. There I saw at work, men whose fathers and grandfathers had worked there before them, the raw material being thoroughly tested and analyzed by chemists trained in the ways and methods taught them by years of experience. The results: The best material of its kind; the business flourishing, and the product of world wide reputation. American manufacturers have not generations of the same family as workmen; but we have the raw material and the skill, and, with more care to the details, should command a higher reputation for their product. The redeeming features of the manufacture of refractory material in America are the strides made in the introduction of silica. It has opened the way for American manufacturers, and it seems as though it is an opportunity for them to show the world its possibilities.

By the introduction of "Sales methods" and "Selling campaigns," many installations of gas burning appliances have been made with profit to the company and benefit to the consumer. The gas company that introduces "Sales methods" and "Selling campaigns" must well consider, before introducing an appliance, its merits and stability, and offer nothing but the best of its kind, at an attractive price, on easy terms of payment. An article that is cheap and sold at a low price is not always the best to introduce. New business, to be permanent, must be on a solid basis, and, once gained, may be a source of revenue by following sales with regular inspection and maintenance. The secret of success in introducing appliances is inspection with maintenance.

High pressure distribution is now a well developed method of supplying outlying districts, and groups of towns and villages from a central point, that could not be supplied with gas service in any other manner owing to the cost of plant installation for the small territory to be served. In large towns and cities a high pressure belt line with district governors increases efficiency in an economical and satisfactory way. Each installation of high pressure service mains is peculiar in itself, and the problems worked out successfully in this country are a credit to the profession.

Statutory requirements for gas companies are as varied as the hues of the peacock; and, speaking in a general way, if it were possible, would it not be well to have requirements more on a calorific standard? On the European Continent (I am speaking more in regard to observations made in Germany) 500 B.T.U.'s became accepted as entirely satisfactory, and candle power was an unknown quantity. Coal gas was distributed satisfactorily to consumers that would compare with the product, as generally manufactured in this country, of about 10 candle power. In the laboratory at Providence, R. I., there are burners in constant use showing the coal gas; also, commercial gas. Among the visitors one day there appeared two eminent German engineers, who, in the course of "sight-seeing" the plant, observed these open flame burners and inquired their purpose. They were told, "It was to indicate at all times the character of the gas that was being made and delivered." They stood and gazed at the lights for a short time, when one said to the other, "Doctor, just look at that flame; what a waste of good material to send out gas at such a candle power!" I said. "Wait, Doctor, until you reach New York city and there see 22 candle power." It is a waste of good material to send out gas at a higher candle power than is common abroad; and the time will come, I hope, when many requirements, now in force, will be abolished and gas companies given an opportunity to cheapen their product for the benefit of all concerned.

Municipal control of public utility corporations in our land is not the factor it is in foreign countries. For service rendered and quality given, I believe, the privately owned corporations in the gas field in New England give more for the dollar than the municipally owned plants that I observed in my travels through Germany. There they distribute an inferior product at high cost to the consumer; maintain plants that, for architectural grandeur and embellishments, are extravagant. Their workmen receive for wages about one-half paid here in New England. Their coal, while somewhat inferior for gas making purposes to our best coals, is delivered at about what it costs the average gas company in New England. Their product is sold to the consumer at a cost per 1,000 cubic feet not any cheaper than some communities are served in New England, and, taking the matter as a whole, I fail to see any benefit to the consumer through municipal control in Germany. From statistics compiled in 1912, there were in Germany 1,474 gas works of all descriptions, 70 per cent. of which were under municipal control.

For the closing chapter I will refer to the broken ranks in our columns of a year ago. Two of our active members have joined the silent majority:

John A. Coffin, Gloucester, Mass.
Charles F. Prichard, Lynn, Mass.

Both have served you as President, with credit and honor and, "Though lost to sight, to memory dear."

Also an associate member:

Rufus E. Holmes, President, Winsted (Conn.) Gas Company.

Committees to present resolutions upon the death of comrades will be appointed as follows, and they are to report at the opening of the session this afternoon.

On John A. Coffin: Messrs. Waldo Learned and W. E. McKay.
On Charles F. Prichard: Messrs. S. J. Fowler and A. M. Barnes.
On Rufus E. Holmes: Messrs. A. H. Norcross and Chas. A. Learned.

In conclusion I would say it has been the custom of this Association to re-elect its President after serving one term. In this I would disagree for many reasons:

Principally, I think one term enough; and, if you were to ask me my other reasons, I would say I think one term enough. The coming year bids fair to be a busy one for me, and I most respectfully recommend that my name be not considered by the committee for re-election.

The papers and lectures prepared for this occasion I hope will be well received, the discussions snappy and to the point; and, when all is over and we have returned to our daily tasks, may we all feel benefited.

On motion of Mr. Barnum, the address was referred to a Committee.

Vice-President Learned appointed as such Committee Messrs. Barnes, Norton and Wyant.

The President assumed the Chair, and the following was read by him, as follows:

Report of the Secretary.

Mr. President and Gentlemen: As Secretary, I would report that, at the last annual meeting, there were elected 8 active and 11 associate members. The resignations were accepted of 4 active and 8 associate. There have been lost by death 2 active and 2 associate members. There are now on the rolls 5 honorary, 141 active and 99 associate members.

I would again call your attention to the Library of the Association, which is in the rooms of the Boston Society of Civil Engineers, 715 Tremont Temple. There have been some additions made during the year. I am sorry to say that there has been some accumulation of dust on the books, owing to lack of use. I would commend the use of the library to the members of the Association.

On motion of Mr. C. A. Learned the report was accepted and ordered filed. As Treasurer, Mr. Gifford reported a total receipt of (including cash on hand) $2,569.42, an expenditure of $2,050.03, and a balance of $519.39. The Auditing Committee's certification accompanied the report, which was, on motion of Mr. Norcross, accepted and ordered filed.

Reading the Correspondence.

At the intimation of the President, the Secretary stated that letters acknowledging receipt of invitation to be at the meeting had been received from the following:

Brundrett, E. L., Pres. Natural Gas Association of America.
Cortelyou, G. B., Pres. New York Consolidated Gas Company.
Cooper, H. S., Secy. Southwestern Electrical and Gas Association.
Dunbar, J. W., United Gas and Electric Company, New Albany, Ind.
Dion, A. A., Pres. Canadian Gas Association.
Forstall, Walton, Chairman Tech. Committe American Gas Institute.
Gribbel, Jno. J., Philadelphia.
Hewitt, A., General Manager, Consumers Gas Company, Toronto, Ontario.
Jourdan, J. H., Vice-Pres. and Chief Engineer Brooklyn Union Gas Company.
Lillie, L., Third Vice-Pres. U. G. I. Co., Philadelphia.
Ramsdell, G. G., Secy. American Gas Institute.
Rice, H. L., Aurora, Ills.
Searle, R. M., Vice-Pres. and Manager, Rochester (N. Y.) Railway and Light Company.
Thomas, C. G. M., Pres. N. Y. and Queens Electric Light and Power Company, L. I. City, N. Y.

The Secretary read in extenso a letter, dated San Francisco, Cal., Jan. 9, 1914, from James A. Burr, Manager, Bureau of Conventions and Societies, Panama-Pacific International Exposition, urging the Association to hold its 1915 convention at the exposition. At the close of the reading the President said, in connection with this matter, it was decided by the Board of Directors, the prior evening, that the meeting for 1915 would be held in Boston, as usual.

Committee on Nomination of Officers.

The President appointed as a Committee to select names for office bearers during the coming year Messrs. D. D. Barnum, B. J. Allen and J. A. Gould, with instructions to report later.

The President then called upon Mr. C. A. Learned (Meriden, Conn.) to read his paper entitled

NOTES ON VERTICAL SETTINGS IN ENGLISH WORKS.

The subject of this paper has attracted the attention of many in the gas fraternity recently, and investigations were very active a year ago, when the price of gas oil advanced to a prohibitive figure; more active, doubtless, than they are to day. It is not the intention of this paper to make comparisons between types, but simply to note some of the conditions which exist, and give results on an English basis.

In an investigation of the English works many peculiarities impressed themselves upon us—and the dissimilarity of English and American conditions was marked:

1. The different kinds of coal used, and their gas producing values.
2. The difficulty in making a comparison between English and American results, in feet of gas per pound of coal.
3. The marked difference in the cost of coal at different works.
4. Of necesssity, the wide variation in price per 1,000 cubic feet for different cities and towns.
5. The various candle power requirements for different districts.
6. The great difference between the old and the new parts of carbonizing plants.
7. The size of old works, and their adaptability to the new style of settings.
8. The almost geographical division of the country into two parts—one manufacturer of verticals installing most of the settings in the north of England, and another most of the settings in southern England.
9. The similarity of the two most popular settings of verticals was so great that it was hard to choose between them.
10. The uniform satisfaction expressed by superintendents and engineers with the settings they were using.

Until the year 1911 there were few companies in America that had given the subject of verticals much attention. For 6 years the settings had been passing through an experimental stage in England, and early in the development a Newark, N. J., gas machinery company thought it saw possibilities for the use of this new type of gas construction in America; and, after an exhaustive investigation, procured the American agency for the Woodall-Duckham system of verticals. About the same time another large American interest became allied with the Glover-West type of English verticals, and the result of these alliances was a plant for 500,000 feet per day in Derby, Conn., and one for 250,000 feet per day in Fitchburg, Mass., of the above type respectively, installed during the year 1911. At present, duplicate equipments at each of there plants proved the faith of the purchasers in the efficiency of the installations. In the spring of 1912 the above were the only two plants of continuous verticals in use in this country.

In order to observe English conditions, and study the types in the home field, the writer and his son went to England last June. Anyone who has visited England, not having been duly attested or accompanied, and tried to see manufacturing plants, will realize the futility of such an attempt. Letters of introduction were, therefore, obtained, and the first plants to be visited were those in and around Manchester. This is the home of the Glover-West system, and where the West Gas Improvement Company, Ltd., do their machine work for Glover-West vertical settings.

Manchester.—A comparison of English and American working conditions, as found in this plant, might be referred to here. The working day begins at 6 A.M., and ends at 8 P.M., in the summer, when the sun sets as late as 8:20. One-half hour is allowed for breakfast, an hour for dinner, and one-half hour for supper. A skilled machinist gets from $9.50 to $10 per week, where in this country the wage is nearly 2½ times that amount. There is a Satur-

day holiday, and the shops open at 9 A.M. on Mondays; hours of labor, about 55 per week.

At this shop we met Mr. John West—a venerable and characteristic English gentleman, 74 years old—father of the industry of West charging and drawing machinery, who for 35 years has made this substantial class of machinery for large gas works. His story of the evolution of the industry and his connection with it was most interesting. Two sons are associated with him, Fred. and Frank West, on whom the mantle of the father is falling.

Manchester has for its gas engineer Mr. J. G. Newbigging, son of the renowned Thomas Newbigging. At the Rochdale Road works, within the city, he was installing a 2,000,000 vertical plant, and later a duplicate is planned, of Glover-West verticals, where a 1,000,000 old-style horizontal setting had been.

Droylsden.—At Droylsden, 6 miles away, and just outside Manchester, we visited the experimental plant where the process had been perfected. This was running, but not at full capacity. Some discarded experimental devices were seen here.

Rochdale.—At Rochdale, another township not far from Manchester, we saw a very modern Glover-West plant of 1,250,000 feet capacity. Mr. Ball, the Manager, stated that, with the verticals, he was able to get 1,000 to 1,200 feet more gas per ton of coal than with the old plant, but with a slight decrease in candle power, say ½ to 1 candle.

Haywood.—Another interesting plant, which was under municipal control, as many are in England, was then visited—Haywood. Mr. Watmough, the Manager, took great pride in showing us around and noting the changes from the old to the new system. The town was small (27,000 people), output in 1912, 132,000,000 cubic feet. The new equipment was one stack of Glover-West verticals, making on an average 243,000 cubic feet per 24 hours, of 17.6-candle power gas, on a No. 2 Metropolitan burner. One *test* made with their coal gave 12,300 feet per ton of 14.5-candle power gas. This means little to us in America, for the grades of English coal are as many as their counties, and a coal mined near a works is used, or mixed with another grade of better gas producing qualities. Here the coal costs 15s. ($3.75) per ton; coke sells for $3.75 per ton, and gas for 2s. 7½d. per 1,000, or 65 cents.

The labor of retort men was 5s. 6d. ($1.37 per day of 8 hours), and 3 men ran this setting, which was very fair for so small a works. This labor included handling coal from store to bunkers, and coke to yard by lift and overhead trestle.

St. Helens.—In the literature of the Glover-West system published in the United States the picture of the St. Helens works is among the prominent ones. St. Helens is the home of Mr. Samuel Glover, one of the patentees of the Glover-West system. It was interesting to sit with him and learn how the new way of carbonization was developed, and the part he played in that development. The earlier patents were taken out by Young and Glover in 1905, and the idea was derived from the shale oil works in Scotland, where vertical retorts were used.

St. Helens has a population of about 96,000; the make in 1912 was 522,000,000. The manufacture in the old settings was 10,500 feet of 16½-candle power gas, while the verticals make 11,600 feet of 15½-candle power gas. The law in that district calls for 14-candle power gas, on a No. 2 Metropolitan burner. Coal is about $2.50 per ton, and labor is about the same as around Manchester—$1.37 per 8-hour day. The plant is owned by the municipality, and from our observation Mr. Samuel Glover is a very popular man in town.

When this plant had been in use about one year, the Gas Engineers' Association of the Manchester district were invited to hold their meeting at St. Helens, to inspect and criticize the new type of verticals—this was in October, 1909. Previous to that meeting many different kinds of coal had been used, and long tests were made under the inspection of impartial experts. The results obtained were very gratifying, the net results showing, with a poor local coal, 11,500 feet of gas—575 B.T.U.'s, 14.8-candle power, or 29,700 feet per retort per day, and about 80,000 feet carbonized per man per day—one man for each shift. This particular coal cost $2 per ton, and was a mixture such as they could not use with economy in the horizontals. Since that time the plant had been doubled, and the results are about 120,000 feet per man per day.

The results in by-products are satiafactory: The coke is clean and grey, has a metallic ring, and is superior to the horizontal coke, and, as in many places, sells for more money than the coke from horizontals.

The tar is thin and poor, but low in carbon, and my informants did not say but that they were able to use it. In many works it was mixed with a great quantity of horizontal tar, and they did not know much about it as a separate commodity. Up to this time we had not seen a large vertical plant running, so a trip was made to Belfast, Ireland, and also one to Lurgan, 20 miles west of Belfast, to see a small vertical plant in use.

Belfast.—At Belfast we met the Engineer, Mr. Smith, a brilliant Scotchman. His superintendent, Mr. Steers, showed us around the works, over the vertical settings and under them. A 2,500,000 plant was working with marked economy at 12-hour shifts, the results being about 200,000 feet per man per day. Belfast has a population of 250,000. They made 2,500,000,000 feet in 1912. Large days' outputs are 11,000,000 feet.

Coke sells for $6.25 per ton; coal costs $4.50 per ton. They figure that their coal gas costs then 13 cents per 1,000 feet—candle power of gas made in vertical retorts, 15½. This plant has been in use one year. It is supplied with a modern conveying system for handling coal and coke, and a monorail device for distribution of coke in the yard.

Lurgan.—Lurgan is a little linen town; neat and clean. The local gas man, Mr. Tallentyre, met us at the railroad station, and escorted us up the quiet street. We did not know when we reached the works, for his residence, with flowers blooming in the front garden, absorbed our attention.

The plant was of 250,000 capacity—here an elevator, or lift, as they always say in England, took the coal to the overhead bunkers, and also the coke to an elevated discharge in the yard. Two men seemed to be the only ones around—one for yard work and one for setting,—also, one man for the setting at night. Though the works are so small the results per man per day are over 100,000 feet. I did not meet a man more pleased with his verticals than the little Englishman, Mr. Tallentyre. He seemed to think there never was anything quite like them. It seemed that very many of the large cities in England were catching the fever for verticals—for both the Glover-West and the Woodall-Duckham Companies reported more orders ahead than they could complete in two years.

Birmingham.—The geometrical centre—and called the "Hub" of England—was visited on our way to London. Here we saw the first Woodall-Duckham plant in our travels. A 5,000,000 plant had just been installed, and run under test for a few months. We struck the town the hottest day we experienced in England—87° and humid. The heat on the benches was fierce, and we were unable to judge of the fine points of that installation, our natural inclination for lower temperature overcoming our desire to investigate hot details.

Birmingham had, however, other interests which attracted our attention. A Meriden silver manufacturer is also in the business there. We were entertained by him, for he had just arrived from America the morning of our arrival in town. He had in his factory commercial gas under 10 pounds pressure—no reducing governors—and with it he was melting sheet nickel scrap which he imported from America. The meter through which the gas was measured looked as if it weighed a ton—a square, cast iron, wet meter, and of modern make. He had to remove the side of his shop to get it into the cellar. The gas was costing him 35 cents per 1,000. It was conveyed through the streets, in ordinary bell and spigot cast iron pipes, with lead joints, the pressure being maintained, of course, by an engine with a sensitive governor, at the gas works. This governor maintained a nearly uniform pressure at all times. Fifteen miles of the special main had been laid for the use of the manufacurers.

London.—It was our good fortune to be in London at the time of the semi-centennial jubilee of the British Gas Institute, and to see there the venerable Mr. Thomas Newbigging. Also, among the notables on the platform, we saw our own Dr. Elliott, of the Consolidated Gas Company, of New York; and among our friends, Mr. R. M. Searle, of Rochester, N. Y.

The meeting was under the able management of Sir Corbet Woodall, as President. By invitation we attended the meeting each day, and at its close were privileged to enjoy a garden party at Chiselhurst, in Kent, the summer home of Sir Corbet Woodall, and all were made to feel perfectly at home.

As previously stated in this paper, many of the works in the south of England which have adopted verticals have chosen the Woodall-Duckham system, We visited 5 or 6 plants in the south of England, and all were of this type.

Kensal Garden.—At the works in London, where the early experimental work was done, a 1,000,000 installation was seen—half of it

working. Here, too, discarded devices were seen, as in Droylsden near Manchester.

Tottenham.—At Tottenham, not far from London, a 1,000,000 setting was found, working on what we judged to be a very high grade of gas coal, called Yorkshire peas. Results here were stated to be 15,000 feet per ton, where 13,000 feet per ton were obtained in the horizontal settings. These high results were partially offset by the B.T.U. results, however, which were given as:

Gross.	Net.
509	457
521	473

with candle power of 13.5. Plants in the London district run apparently on low candle powers.

You are doubtless aware that a candle power of 13.5, or B. T. U.'s 460 net, is pretty poor stuff, according to American ideas of candle power, for I am informed that all tests in England are on a No. 2 Metropolitan burner, and, comparing it with our American burners, it reads 1-candle high on low candle power readings, and nearly 2 candles high on high candle power readings. If the above is true, 13.5-candle power, Metropolitan No. 2, is about 12.5-candle power, American standard.

One thing is certain—gas of such low candle power must always be used with mantle burners; and that is the universal practice in and about London, where the candle power is so low and the cost per 1,000 low also. I only saw one place, the "Cheshire Cheese," Fleet street, London, where gas was being used in a batswing burner. It was the poorest gas I ever saw. It was evident the open flame was used for effect.

In the visits to English plants we expected to see only those that were running, and at that under the best conditions. It did not occur to us that some of the plants would be out of use, or at least, we would hardly be privileged to inspect them.

Luten.—The contrary, however, was our experience in one case. At Luten, 30 miles north of London, the great straw hat town of England, a plant of Woodall-Duckham verticals of 500,000 capacity was installed 5 years ago. Later, another 500,000 plant was added. When we arrived at the works we found ½ the setting idle, the iron work on top removed. This setting had been running for 3 years. The iron work, of light material, had become warped and burned. Seven of the 8 slots, made of small brick, were in perfect condition. The eighth showed a bulge near the top, say 4 feet square. It was decided that the only repairs necessary were to replace the bulge with new brickwork, paint all the slots with Tamac, a liquid wash to fill in the interstices of the brick, so as to present a smooth surface, put on new and heavier mouthpieces, and start the bench up for another 2 or 3 years' run. Tests made on this first setting showed as follows:

First 6 months, 12,300 feet per ton — c.p. (average) 16.6
Next 4 " 12,800 " — c.p. (") 16.4

Results for the day previous to our visit showed 473,000 feet through 7 slots in the companion setting—one out for scurfing—which means 67,600 feet per slot, or about 540,000 feet per setting of 8 slots, under ordinary working conditions, giving 16.2-candle power.

Tests on old style horizontals were 11,300 feet per ton; average candle power, 18.3. Coal used, Yorkshire nuts. Here the candle power was very high on both horizontals and verticals as compared with those that prevailed in and around London. The town has a population of 52,000. Output in 1912 was 513,000,000 feet. Price of gas 45 cents per 1,000.

The trip to Luten was perhaps the most interesting of any, and it seemed worth the expense of the entire trip to England to see how well the settings had stood up after 3 years' continuous use. This speaks well for the material of which the slots were made.

Poole.—The real show plant of the Woodall-Duckham system is at Poole, near Bournemouth, just beyond Southampton. Here one of the patentees' sons has charge, ably assisted by a corps of bright young men who superintend the different works. Here, too, is a special purification system, a copy of which Mr. Searle, I understand, expects to install in Rochester. Limited time at this place, however, did not allow of more than an inspection of the vertical works.

A short time ago the *Gas Age* showed a photograph of the retort house at Poole in its advertising columns. A reference to this building may be of interest here. It is of I-beam and 2-inch "Hy-rib" concrete construction, quite expensive to build in this country, I believe—about the equal of a substantial brick building—but in England much less expensive than brick.

Poole is on the bay, or harbor. Here the weather is quite mild in winter, and, by keeping the exposed ironwork painted, this construction answers very well.

The vertical works consist of 6 settings, of 4 slots each; total capacity 1,500,000, making 12,400 to 12,500 feet per ton of 14.5-candle power gas. The Beasley calorimeter shows a straight line on 500 B.T.U.'s. The coal used is Yorkshire nuts, and costs $4.25 per ton. The general price of gas is 62 cents per 1,000.

The Parliamentary standard is 15½-candle power, so they are obliged to make some water gas—about 40 per cent when we were there—of 16½ to 17-candle power, mixing it with the coal gas to cover the law. They are also still making gas in horizontals, and the returns from this type are 11,500 feet to 11,600 feet per ton of 14.2-candle power gas.

It will be seen that they are working the horizontals as hard as they can when the respective candle powers are:

Vertical	14.5	12,500 feet
Horizontal	14.2	11,600 feet

Three men, apportioned as follows, per shift of 8 hours, were handling this 1,500,000 plant—1,250,000, or 5 sets of slots in commission at the time of our visit, with results of 140,000 feet per man per shift:

1 man on top; man on bottom, handling coke; man on conveyor and outside coal.

Their records show 13 pounds of coke used for 100 pounds of coal. They sell 11.4 cwt. of coke per ton of coal carbonized. This, they claim, is the correct way to figure coke sales, and they consider the above good results.

Interesting details were observed at this plant, such as a Koerting steam jet for scurfing the slots—said to be very efficient and quick in results; we saw, also, a Blachett washer for separating the coke from the screenings by use of a long inclined cylinder and water under pressure. Though we did not see this working, we were told it was most efficient, and reclaimed all the fine coke from water gas and horizontal clinker. The large pile of clean, washed coke not removed from the collection pit evidenced the truth of the assertion.

Bristol.—The last place visited was Bristol, in Western England. Here the Woodall Duckham Company were installing 32 slots in 2 settings of 16 each, and, with a very poor local coal, these settings are to make 1,500,000 per day.

English retort houses of old horizontal through settings lend themselves very readily to vertical construction, being about 66 feet wide—wide enough to install two lines of verticals with good floor space between; the side walls are 12 to 15 feet high, and only the roof of an old house has to be removed to make it ready for the new work. Such was the case at Bristol. The construction was proceeding rapidly on one setting of 16 slots, in all stages of its construction resembling steps in partially completed work. It was interesting to watch the mason work as it progressed step-by-step from bottom to top. Here masons were paid 21 cents per hour, and time-and-a-half after 5 P.M. The day begins at 6 A.M. and ended at 7 P.M., with half-hour and hour intervals for meals.

Mr. Irving, the veteran engineer of the Bristol plants, said they were longing for the time when these settings of 1,500,000 and their duplicates would be completed, so that labor conditions might improve. On the old horizontals they were only able to make about 2,500,000 per day with 150 men (three 8-hour shifts) or 16,600 feet per man; but he confidently expected to make with the verticals 3,000,000 feet per day, with 25 men, or 120,000 feet per man, and from results in other parts of England he will do it easily.

Bristol is a large place, and has 3 gas plants. The population is 360,000. Output in 1912 was 12,900,000,000 cubic feet. Gas is sold from 36 cents to 50 cents per 1,000. With the local coal the horizontals make 10,000 feet per ton of about 500 B. T. U.'s gas.

Conclusion.—From general information obtained, and from a conversation in London with one of the prominent Scotch firebrick makers, who had gone through the school and learned his lesson, I was convinced that we, in America, have something yet to learn on the subject of firebrick for vertical settings. The few examples of different kinds of brick which I have seen in America, and their action in verticals, lead me to go slow in making a choice, for up to date every setting installed has some new kind or class of brick in it different from that of any other previously constructed. It took 3 years, at least, if not 5, for the Englishman to get his brick right, and I think it will take some time before we get brick that will stand the extra heat required to carbonize our American coals. Progress

is surely being made, and before another year has passed the materials in the settings now being constructed and under fire will have been proven good or bad. The representatives of the two English concerns on this side of the water are doing all they can to get the "bugs" out of the settings and Americanize the equipments so that they can be manufactured here at reasonable cost.

The companies that are convinced that verticals are the coming thing, and can wait a year, will obtain a wealth of knowledge, and possibly save their stockholders much money. If the companies now working verticals in New England will tell us of their success, or failure, if any, in a general discussion of this subject, the object of this paper will have been realized.

(To be Continued.)

[Communicated.]

A Bit of Gas History.

By "W. J. W."

Through sheer accident and coincidence there recently came to my notice a bit of history that appeared to me worth noting; and, having pondered, I thought it might be interesting to you.

On a nearby Sunday, taking up an old scrap book of foreign travel photographs, collected by my father while abroad 25 years ago, the first view was the drawing room of Sir Water Scott's famous home, Abbottsford, on the river Tweed. I had often looked at it, but this time I observed that the photographer had mistakenly entitled it as the "Library at Abbottsford." This led me to examine the photograph closely; and in doing so I noticed that two gas chandeliers in the room were shown, a circumstance that fixed my attention; for the house (built in 1820) is said to have remained unchanged since Sir Walter's death a few years later; while I had supposed gas lighting to be a comparatively recent invention. However, having no particular knowledge of or interest in the subject, I probably should never have thought of it again, but for the following odd little coincidence, which occurred an hour or so afterwards. At that time I took down to read a book which I think stood on the shelves unopened since my father's death 20 years ago, entitled "Retrospect of a Long Life," by S. C. Hall, an Englishman of letters of the last century—this was Hall's last work, written when 80 years old, and published in 1883. The very first topic Mr. Hall mentions (Vol. 1, page 1), is that of "Lighting," and he wrote:

"Beginning at one of the lowest rungs of Memory's Ladder, I carry my readers back to a time when the tinder box was a household god * * * In those days lighting by gas was a novelty that was making its way into public favor, slowly and against a furious storm of opposition; and, through the unsafe, miserably lit streets, tottered at night, feeble old creatures with staves and lanterns who were (by a fiction) styled 'Watchmen,' but whom the public knew best as 'Charles,'" * * * Familiar to me in my youth were the *oil lamps*, those makers of darkness visible, in our thoroughfares, which the now soverign king, Gas, has displaced. It is strange but true, that one of the most bitter opponents to the introduction of gas was Sir Walter Scott, who denounced the 'pestilential innovation' in a public speech; but the 'Northern Wizard,' speedily changing with the times, took a prominent part in the formation of a gas company, causing Abbottsford to be lit with the 'dangerous and deleterious air."

On turning to Lockhart's "Life of Sir Walter Scott," I found Mr. Hall's memory well sustained, in a series of references running through Volume V. of that work, which covers the period of Sir Walter's completion and happiest occupancy of his beautiful estate of Abbottsford. Of this (Chapter X., page 253), his biographer says:

"Scott had always leisure, as well as temper, at command when invited to take part in any business connected with any rational hope of public advantage * * *. He was invited, for example, to place himself at the head of a new company for improving the manufacture of oil gas, and, in the spring of this year (1823) began to officiate regularly in that capacity * * *. The reader will perceive in the correspondence to which I must return hints about various little matters connected with Scott's own advancing edifice on Tweedside, in which he may trace the Chairman of the Gas Company."

In at least half a dozen of the succeeding letters to his circle of friends, such as Lord Montago, Terry, Maria Edgeworth, the novelist, and Johanna Baillie, the poetess, Scott rejoices in his new illuminant. The following being examples in proof:

(Page 266). "I must not omit to tell you that my gas establishment is in great splendor, and working, now that the expense of the apparatus is in a great measure paid, very easily and very cheaply. * * * In our new mansion we should have been ruined with spermaceti oil and wax candles, yet not had one-tenth part of the light. Besides we are entirely freed from the great plague of cleaning lamps, etc. There is no smell whatever, unless a valve is left open and the gas escapes unconsumed, in which case the scent occasions its being instantly discovered. * * *. I never saw an invention more completely satisfactory in the results." Page 306: "We are glorious with our gas light * * * if the gas has no greater objection than I have yet seen, or can anticipate, it is soon like to put wax and mutton-suet entirely out of fashion." And, page 336:

"For my part, when I write on such subjects, I intend it shall be a grand historic philosophico poem upon oil gas; having been made President of the Oil Gas Company of this City."

These quotations ought to have a place in the literature of your profession.

If the great author of the Waverly novels felt and wrote thus about gas for lighting alone, what would he have thought and written of its place in the world to-day?

[Continued from page 125.]

Report of the Committee on Power Economies In Gas Plants.[1]

[Written for Eighth Annual Meeting, American Gas Institute.]

Arched Furnaces.—It is claimed that these are more efficient than plain settings for anthracite coal, as the heated brick proves an aid in igniting freshly fired coal, and more even furnace temperatures can be maintained. It is doubtful if the slight gain in more rapid combustion and even temperature, will offset the loss of radiant heat due to increasing the distance from the fuel bed to the heating surface, and the high cost of installation and maintenance of arches. With bituminous and semi-bituminous coals, arched furnaces may prove of decided advantage in spite of their maintenance cost, if arches are properly constructed and are patched before they begin to fall. The arches should be high quality fire brick, shaped to fit with little or no binder.

If arch brick fit each other perfectly it is advisable to lay them dry, but it is generally necessary to use some fire clay. This should be mixed very thin and the brick dipped in it, instead of buttering with a trowel. Arches of regular 9 inch straights and wedges, require thicker joints and are likely to quickly burn out. Arches should be cooled by passing air over them, covering the top of the air passage with an arch of red brick or with a flat plate, and secondary air may be supplied to the furnace by means of such an arch duct. A very valuable protection to the inside of an arch is a coating consisting of a mixture of 40 per cent. carborundum flour and 60 per cent. of fire clay, mixed to the consistency of white wash and applied with a brush. This mixture protects the joints and fuses the interior of the arch into a solid mass, when the working temperature is reached.

(F) Draught.

Boiler furnaces may be supplied with air for combustion in three ways.

(a) By natural draught of a stack.

(b) By forcing air under pressure through the fuel bed; the stack draught in this case being only to prevent pressure above the fire.

(c) By artificially induced stack draught, air being drawn through the fire and boiler passes by an exhaust blower at the base of the stack.

For small size anthracite and for coke breeze forced draught is to be preferred, but there is question as to the relative efficiency of fan and steam jet blowers.

Jet blowers are low in cost and deliver moist heated air, which is of special value with small anthracite and with some bituminous coals. It is safe to figure that the cost of operation will be about 50 per cent. greater than that of turbo blowers, and double that of a fan blower system. Average figures for steam consumption of blowers

1. Slightly abridged.—Eds.

in percentages of boiler output, when used with anthracite coal, are as follows:

Large fan blowers with slide valve engines, 3 to 6 per cent.
Turbo blowers, 4 to 7 per cent.
Steam jet blowers, 5 to 11 per cent.

With bituminous coals less draught is required, and the steam consumed will be about 2 per cent., 2 to 3 per cent., and 4 to 7 per cent.

Steam blowers are free from mechanical troubles and consequently less liable to cause interruptions to service. This is important in plants of small reserve capacity.

Operating Economy of Forced and Natural Draught Systems.—The choice of natural or forced draught depends largely on available fuels, load factor, hours of operation, etc. In a plant designed to use bituminous coal, natural draught is generally selected, but manufacturers of forced draught equipment are using such strong arguments in favor of their systems that it will be instructive to determine if the advantages claimed are substantiated by results obtained in practice.

It is claimed for forced draught that by reducing the intensity of draught above the fire it reduces the rate of flow of gases through a boiler, and brings all parts of the heating surface in contact with the gases; in other words, there is less tendency for the gases to by pass portions of the heating surface. In actual practice the gain in efficiency due to this "bottling" of the gases is slight if any. This is because the gases when moving rapidly apparently transmit heat more efficiently than when stagnant, and because, with r.o.m. bituminous coal, it is possible to obtain better air distribution through the fuel bed with natural draught than forced. If air under pressure is forced through a fuel bed of fine and lump coal, the heavy pressure forces the air through the fine coal around the lumps and makes air holes and an irregular fire bed.

Forced draught reduces the loss from cold air admission through the fire doors, but with good firing this is small. Forced draught reduces the trouble from hard clinker to some extent, especially if steam jets are used. In a plant carrying a variable load, the perfect control of steam pressure obtained by a forced draught system may be of sufficient advantage to outweigh all other considerations. Good pressure control may be had with natural draught, with damper regulators, but for extreme load fluctuations forced draught provides better control.

Opposed to these possible advantages of forced draught we have the fact that it consumes steam varying from 2 to 7 per cent. If a plant has sufficient natural draught to meet maximum load conditions it is seldom possible for forced draught to give enough increase in economy to make up the power supplied to operate the system. Improved efficiencies are obtained with bituminous fuels, by installing forced draught, but these same results could probably have been obtained if the boilers had been properly operated with natural draught. Some makers of forced draught systems sell them on a guaranteed saving and make good by actual test, but generally the preliminary natural draught tests are run under bad conditions, while the demonstration tests are made by trained engineers. In other words, the same saving could probably have been shown in natural draught operation if the boiler had been properly operated, and the increase in efficiency was not due to the mechanical draught system but to proper furnace operation.

Economy Tests.—These guarantees are generally based on results of 8 or 10 hour tests. All tests are open to errors in coal and water weights, and in tests of less than 24 hours such errors affect the results to a greater extent, and in a short test a skillful operator can regulate fire conditions to get greater value from the coal used than if the boiler were in regular operation.

It is recommended that in making contracts for any economy producing devices, their guarantees of economy be based on tests of at least 24 hours.

If the capacity of a steam plant has to be increased it can be done in three ways:

(a) By installing additional boilers.

(b) Increase the capacity of the old boilers by adding to the height of the stack and giving increased draught intensity.

(c) By installing forced draught.

The most satisfactory method must be determined for each special case, but it may be well to briefly discuss the relation between boiler capacity and efficiency; in order to see under what conditions boilers may be efficiently worked beyond the capacity for which they were designed.

Manufacturers design their boilers to operate with maximum efficiency when evaporating 3.45 pounds of water from and at 212 degrees, per square foot of heating surface per hour; equivalent to 10 square feet of heating surface per boiler horse power. As a rule when the capacity of a boiler is exceeded, its efficiency decreases; because its furnace and gas passages are proportioned for the normal evaporation rate, and as more coal is burned the velocity of the gases is increased, and they reach the stack at higher temperatures. These losses are partly neutralized by an increase in furnace temperature and a better absorption per square foot of heating surface due to the rapid flow of the gases. It has been found possible to get as high as 200 per cent. of the rated capacity of the boiler with little loss in efficiency, if the boiler and furnace are properly designed and operated. In electric stations it is general practice to design furnaces for this during peak load, thus reducing investment cost, and the number of banked boilers carried for peak load service. It is possible to operate boilers at 300 per cent. of rating with safety, provided heating surfaces are free from scale and soot, and grates, furnace and draught systems are designed for such operation. There is, however, considerable question as to the advisability of so doing. The grate surface and gas passages are proportioned to give maximum efficiency for a certain load on the boiler, and any considerable variation above or below this point will mean reduced efficiency, though it may be slight if the boiler is in good physical condition and properly operated. Gas works conditions are usually such that the load is fairly uniform, or subject to peaks of short duration only, and it would be bad practice to operate boilers continuously at high overload, as a loss of efficiency is sure. It is, however, good practice to so equip them that they have sufficient overload capacity to carry short peak loads, and it may be economical to carry high ratings during the winter, rather than use additional boilers.

Any gas works which is required to operate continuously should have at least one reserve boiler, as a protection against accident, and to insure that boilers may be shut down for cleaning and inspection at regular intervals. In the consideration of plant capacity increase it is assumed that the plant has such reserve capacity.

Costs of Obtaining Increased Plant Capacity.—If additional steaming capacity is had by installing new boilers, the cost of such equipment will vary from $10 per horse power for return tubular boilers and setting (without stack, breeching or piping) to $40 per horsepower for a water tube boiler with all the above equipment. In addition the cost of boiler house extensions must be considered. If sufficient new equipment is installed, the boiler plant can be operated at its point of best efficiency throughout the year, but as the winter load is often greater than that in summer, it is probable that during the greater part of the year there will be loss in interest and depreciation on idle equipment, hence before recommending new boilers for a plant, you should consider the possibility of taking care of the maximum demand with the present equipment.

Take the case of a gas works equipped with 4 water tube boilers of 200-horse power each. One of these boilers is held in reserve, the load being carried on two of them during the summer, and three, operating slightly under rating, during the spring and fall, and slightly above rating during the winter. With good bituminous coal, the stack draught is sufficient to allow a maximum working capacity of 130 per cent., or a total output from the three boilers of 780-horse power. When the demand increases beyond this point, (that is the maximum hourly output on the maximum day of the year) the fourth boiler can be put in service, which will be safe practice for a few days, but unsafe for an extended period. This demand will surely increase the following year, and there are three ways of obtaining the necessary increase. A new boiler can be installed, connected to the same stack, for from $3,000 to $6,000, which would be idle for about 9 months of the year, and show no return on the investment, but it should insure economical operation throughout the year and absolute plant safety.

If the plant has a steel stack of sufficient diameter, and conditions allow of the stack being put out of service, the draught may be sufficientle increased by adding to the height of the stack, and the boilers operated at 160 per cent. of rating instead of 130 per cent., giving a total increase of 180-horse power, almost as much as from another boiler. The change might be made for a few hundred dollars, and possibly necessary changes in furnace design can also be cheaply made. There may be a slight loss in efficiency during three months, by operating at overload, but this should be less than the interest and depreciation on new boiler equipment.

If, however, the stack cannot be increased in height or is small in

(*Continued on page* 138.)

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NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, MARCH 2, 1914.

[Official Notice.]

Annual Meeting, Indiana Gas Association.

Indiana Gas Association,
Office of the Secretary,
Indianapolis, Ind., January 24, 1914.

The annual meeting of the Indiana Gas Association will be held at Terre Haute, Ind., Wednesday and Thursday, March 11th and 12th, 1914, the sessions each day, beginning at 10 A.M. The headquarters will be the Terre Haute House, where 70 rooms have been reserved for the convention delegates. It is advisable that early application be made for reservations. If the available rooms are all spoken for, reservations may be made at the Filbeck, Plaza, or Great Northern Hotels. The programme includes these numbers:

Address by a Member of the Public Service Commission of Indiana.
President's Address, by A. S. Cooke, Terre Haute.
"Employers' Compensation," by O. O. Thwing, Chief Engineer, Western Gas Construction Co., Fort Wayne.
"Light and Illumination" (demonstrated), by R. F. Pierce, Manager, Illuminating Engineering Laboratories, Welsbach Company.
"Calorific Value, as Expressing the True Quality of Gas and Conditions Governing Its Supply," by J. B. Klumpp, Inspecting Engineer, United Gas Improvement Company.
"Yields of Gas from Coal as Related to British Thermal Units," by J. C. Silverthorn, Superintendent, Evansville (Ind.) Public Service Company.

The Association will consider the question of revising its Constitution and By-laws, so as to provide that any member whose dues shall remain unpaid for a term of 1 year (instead of 3 years, as at present provided), may, at the discretion of the Executive Committee, be dropped from the roll of membership. Philmer Eves, Secy.

[Official Notice.]

Tenth Annual Meeting, Illinois Gas Association.

Illinois Gas Association,
Office of the Secretary,
115 North Oak Park Ave.,
Oak Park, Ills., Feb. 21, 1914.

To the Members, Illinois Gas Association: The Tenth Annual Convention, the Illinois Gas Association, will be held in Chicago, March 18th and 19th, 1914, at La Salle Hotel. The following papers are included in the programme:

"The Welding and Cutting of Metals in the Gas Industry," by W. P. Harding.
"Trenching Machines Versus Hand Digging," by C. B. Strohn.
"Utilization of Gas Appliances in the Wholesale Preparation of Food," by I. A. Hoy.
"Street Lighting by Gas," by F. V. Westermaier.
"Applications of Centrifugal Machinery for Boosting and Exhausting," by E. A. Hultz.
"Modern Coal Gas Practice," by W. E. Hartman.
"The Process of Manufacture of Gas Stoves and Ranges, from the Raw Materials to the Finished Products."
"The Process of Manufacture of Pipe, from the Raw Materials to the Finished Products."

The banquet will be held, in the Red Room of La Salle Hotel, the evening of 18th. To be of the modern stag style, with prominent speakers and vaudeville acts.

Copies of the papers and the programme will be mailed to the members on March 10th. Horace H. Clark, Secretary.

[Official Notice.]

Sixth Annual Convention, Pennsylvania Gas Association.

Pennsylvania Gas Association,
Office, the Secretary, West Chester, Pa.,
Feb. 23d, 1914.

To the Members, the Pennsylvania Gas Association: The Sixth Annual Convention, the Pennsylvania Gas Association, will be held in Allentown, Wednesday, Thursday and Friday, April 8th, 9th and 10th, 1914. The headquarters will be in the Hotel Allen. A list of the other hotels will be mailed. Early reservations are requested so that every member attending may be properly accommodated. Papers on the following subjects are promised:

"Improving Operating Conditions for Small Works."
"Office Practice."
"New Business Methods."

There will also be a number of topics up for discussion, and in order to give sufficient time to the more important subjects each member is asked to submit such subjects as he may be interested in, and the topics receiving the greatest number of requests will be considered.

All requests should be forwarded to Mr. G. S. Speaker, Lebanon, Pa.

The entertainment arranged provides for this;

Tuesday night: Informal Dutch supper.
Wednesday night: Theater.
Thursday afternoon: Open.
Thursday night: Banquet.

The Secretary requests that the postal card enclosed with each member's preliminary notification be returned at once to Mr. Crankshaw, to the end that the work of the Committee may be successfully carried out. W. O. Lamson, Jr., Secy.

BRIEFLY TOLD.

February Meeting, Philadelphia Section, The Gas Meeters.—The Philadelphia Section, The Gas Meeters, made a decided departure from its usual practice in respect of the banquet, held in the Bingham Hotel, the night of Thursday, February 19th. Mr. Edward James Cattell, City Statistician, of Philadelphia, who was the speaker of the evening, is one of our best known authorities on industrial and trade statistics. In his address he complimented the gas industry through the suggestion that gas companies were largely responsible for the change, in the attitude of the public towards service corporation. He predicted, further, that the gas companies would soon be even closer to the public than is the case to-day. Mr. Stanley Grady, Eastern representative of the Roberts-Mander Stove Company, was Toastmaster. Mr. J. D. Taylor, Jr., Southern Salesman, the Estate Stove Company, was on hand, with his usual, prolific line of stories, and a number of other members of the body contributed much that was enjoyable to the fund of entertainment.

MID-WINTER MEETING, NEW JERSEY STATE GAS ASSOCIATION.—The mid-winter quarterly meeting of the New Jersey State Gas Association was held at Woodbury, N. J., Tuesday, the 24th ult., in the Casino of the Woodbury Country Club. This place was particularly appropriate as an assembling point for gas men, in that it is unique in being the only club in the world having its house gas lighted and gas heated; its cooking all done by gas; with gas lighted tennis courts, and gas lighted putting-green, for outdoor night playing. The welcome given those attending was very marked, the ladies of the Club serving in person a very enjoyable luncheon. Those in charge of this feature were Mrs. F. W. Hamerstrom, as Chairman, and Mrs. Henry H. Clark, Mrs. Lewis Starr, Mrs. A. Browning Canfield, Mrs. Benjamin Thorpe, Mrs. Myron E. Douglas, Mrs. Edward M. Greene, Mrs. Josiah Glover Cloud, Mrs. M. Norris Twells, Mrs. George Gill Greene, Jr., Mrs. Sverre Gulbrondsen, Mrs. Charles De Ford Besore, Mrs. Daniel P. Mitchell, Miss Helen Botsford Clarke, and Miss Margaret N. Thorpe. Immediately after luncheon, President C. H. Butcher called the session to order, expressing his appreciation of the large attendance. Omitting the roll call, the minutes of the November meeting were read and approved, and note made of 12 new members enrolled, bringing the total to 124. The Report of the Committee on "Free Maintenance of All Gas Appliances by the Gas Company," prepared by Mr. J. P. Conroy and Mr. J. M. Brock, was read by the latter. They advocated the unlimited maintenance of gas appliances, including lights. This proposition called forth remarks from Messrs. W. G. Gribbel, C. W. Hoy, W. W. Barnes, H. Cohen, G. L. Dold, S. J. Franklin, F. N. Hamerstrom, W. D. Barry, H. P. Davis, B. K. Johnson, S. T. Corliss, R. R. Young, Louis Stotz, J. P. Hanlan, and, finally, J. P. Conroy, in rebuttal. Following these, Mr. L. J. Strauss spoke on "Merchandising," but as the time was short he was able to give but an outline of what he had in mind to say, and what his listeners hoped to hear at greater length. The meeting adjourned at 5 P.M., some of those in attendance accepting the invitation given by Mr. Hamerstrom to stay for the Club Smoker in the evening. Altogether the record showed a very satisfactory meeting.

NEW PROFIT SHARING PLAN.—A manufacturing company in Massachusetts has put in operation a plan of profit sharing by which each employee is paid a dividend upon the amount of his year's wages, equal in percentage to that paid the stockholders. The only conditions are that the workman shall have worked the whole year, and that his services be satisfactory to the management; the latter provision apparently being proven by compliance with the first. In cases where a year's service is not consummated, the dividend lost to the employee is credited to a fund used for the relief of the old, disabled men. The plan is not only easily understood by the worker, but certain in its operation. It is not based, as many such plans, upon a question of how much the company has made in profit; something the workman often finds it impossible to ascertain; and where that is the measure of the workman's dividend suspicion and trouble often follow. Under this plan, dividends to stockholders will probably be declared every three months, and what these are become of common knowledge. The company employs upward of 3,000 persons and pays annually in wages not far from $1,800,000. This profit sharing would result in increasing the income of the 3,000 employees for the current year by about $144,000, 25 per cent. of what the stockholders would receive on an 8 per cent. basis. The plan, therefore, amounts to admitting to a one-fifth partnership in profits—but not in losses—to the company's faithful and steady employees.

FEBRUARY MEETING, NEW YORK SECTION, THE GAS METERS.—The February dinner of the New York Section of The Gas Meeters was served in the restaurant of the Dun Building, Broadway and Duane street, Thursday last. Chairman Pettes being unable to attend, Commissioner Ambler very ably presided, and was responsible for an exceedingly interesting reunion. The evening's address was by Mr. T. E. Dockrell, advertising expert, who told about how success was had, and of our sub-conscious estimates of men and things. Following this came the story telling contest, in which a dozen members participated, all scoring so closely that the winner of the decorated "Stein" had to be decided by lot. This fell to Mr. J. P. Conroy, who never fails to qualify. The 70 in attendance thoroughly enjoyed the sea food dinner, with its accompanying spirit and good-fellowship.

CURRENT MENTION.—

MR. S. P. VECKER, Manager, the Key West (Fla.) Gas Company, has been elected a member of the Finance Committee, and of the Publicity Committee as well, of the Key West Board of Trade.

AT the joint meeting of the Philadelphia Section, the Illuminating Engineering Society, and the Franklin Institute, of Philadelphia, held in Institute's lecture hall, the evening of February 18th, the chief speaker was Doctor Herbert E. Ives, whose interesting narrative closely held the attention of his audience. The meeting was preceeded by a dinner well-served in the headquarters of the Engineers' Club, 1315 Locust street.

A CORRESPONDENT, in Mount Vernon, N. Y., writing under date of the 24th ult., incloses this mention: "The mid-Winter dinner of the Superintendents and department heads of the Westchester (N. Y.) Lighting Company was served (and splendidly served) in 'Murray's,' New York city, the evening of February 21st. About 40 shared in it—the diners were served at an eligible part of the balcony, thus affording them ample opportunity to witness the gay scenes portrayed on the dancing floor below. The occasion served particularly to emphasize their thought respecting Mr. Charles G. Duffy, of the accounting department, who was about to join the staff of the Central Union (N. Y.) Gas Company. After dinner, the party reassembled in a nearby committee room, and Mr. Albert M. Keene, Comptroller of the Westchester Corporation, presented to the astonished guest of honor, on behalf of his associates, a gem of a timepiece of gold. And a further surprise awaited him in the presenta tion of a splendid example of a gold encased pencil, dangling from a golden chain—the last itemized tokens were from his more intimate force mates in the accounting division. Appropriate speeches were made by these of his associates: Mr. Charles F. Bryant, Auditor; Mr. George T. Macbeth, Engineer gas division; Mr. W. L. Bruce, of the Claim Department; Mr. Warren L. Secord, Superintendent New Business Division; Mr. A. E. Arnold, of the Legal Section, and others. Mr. E. W. Bassett, formerly in charge of the Company's Tarrytown office, but now with the Public Service Commission, Second New York District, was a guest."

MR. W. J. MCCORKINDALE, Manager, the Wilmington (Del.) Gas Company, has been obliged to arrange the details of a "Conscience Fund," through having recently received a newspaper in which was inclosed a $1. With the bill came a letter, printed in lead pencilling, conveying this message: "After having been dishonest with the Gas Company, I hereby inclose 'conscience money.' What a relief?"

SUPPOSE the People's Gas Light and Coke Company, of Chicago, started a like fund, and met with anything like fair response thereto! the Treasurer would, in time, be obliged to advise the calling in of a round portion of its funded debt. Come to think of it, why the need of going so far abroad, for certainly the Treasurer of the New York Cansolidated Gas Company, on like account, could get together even a "rounder" portion.

AT the annual meeting of the Fall River (Mass.) Gas and Steam Pipe Company the following officers were elected: President, J. Edmund Estes; Treasurer, Justin M. Read; Clerk, Edmund Y. Anthony; Directors, J. E. Estes, W. A. Read and J. E. Read.

DR. C. S. HOLDEN, of the Attleboro (Mass.) Board of Health, has reported that the Board is now the possessor of a pulmotor, which device was purchased by the Attleboro Gas Company and presented by it to the Board.

MR. HOWARD S. REESIDE, Vice-President of the American Security and Trust Company, has resigned that position in order to devote all his time to the position of President, the Washington (D. C.) Gas Light Company, which selecting dates from the latter Company's annual meeting, held some days ago.

MR. R. W. FOSTER, Chief Engineer, Philadelphia Independence Bureau of Inspection, addressed a large representation of the staff of the Consolidated Gas Company, Boston, the evening of the 24th ult. His subject was, "Accidents and Their Prevention." The presentation was well aided by copious lantern slide illustrations.

THE John L. Rossell Manufacturing Company has been incorporated to manufacture fixtures for gas and electric lighting. It is capitalized in $15,000, and its headquarters will be in Naugatuck, Conn.

MR. A. A. WEBBER is head of a committee that has in view the construction of a gas plant to be operated by the municipality of Kingsburg, Cal.

(Continued from page 135.)

diameter, it is necessary to consider new stacks or a false draught installation. Such a plant would require, for a maximum sustained capacity of 160 per cent., a stack 150 to 175 feet high, and 7 feet in diameter, which will cost about $8,000, if brick, and $5,000 if of steel. These costs shows that increased capacity can be almost as cheaply obtained by installing an additional boiler if it can be done without extending the boiler house, or adding to the stack.

A steam jet forced draught to give 160 per cent. of rating can be installed for from 50 cents to $1 per horse power, or for from $400 to $800. A turbo blower installation will cost about twice this and a fan blower considerably more. With forced draught the maximum capacity can be increased well beyond the required 160 per cent. with little additional cost, while with stack draught, the cost increases rapidly with the increase in height of the stack, and the maximum gain has a fixed limit for each stack height.

Increased capacity can usually be obtained, with less initial cost, by a forced draught installation, than in any other way, except by increasing the height of the present stack. It is possible that the cost of operating such a system, with depreciation and maintenance, may be greater than interest and depreciation on new boiler or a new stack. In the case under consideration this would probably not be true, as the forced draught would only be needed during the winter, and the boilers could be operated with natural draught 9 months of the year.

Relation Between Height and Area of Stacks.—It has been customary in designing stacks to pick from a table of dimensions the size stack which will give the required capacity in horse power, and as costs increase more rapidly with the height than with the diameter, low and large diameter stacks are generally selected. Boiler steaming capacity is determined by the amount of coal which can be burned on each square foot of grate per hour; and the greater this unit consumption of coal, the thicker the fire which must be carried, the greater the fire resistance and hence the greater the intensity of draught required. Draught intensity varies directly as the height of the stack for the same temperature of escaping gases, and is the same for any diameter, provided they are of sufficient area to allow the passage of furnace gases without excessive friction.

If it is desired to increase the steaming capacity of each boiler, by increasing its rate of coal consumption, it may be done by increasing the stack draught intensity, and in a natural draught installation, this must be done by increasing the height of the stack. If the increased capacity is obtained by installing additional boilers, or in cases where it is advisable to increase the ratio of grate to heating surface, it is a question of adding to the gas capacity of the stack or stacks, rather than to the draught intensity, and this capacity can be obtained by an additional stack of the same height, or if the stack area was previously excessive, without any stack changes. Increased plant requires increased stack area, to give outlet for an increased volume of gases, while increased capacity for individual boilers, meaning an increased rate of combustion, requires increased draught intensity by greater stack height. A stack having too great diameter may reduce draught intensity by lowering the stack temperature by excessive radiation.

For average conditions it is safe to assume that, with a flue gas temperature of 450° F., each 100 feet of stack height will give a negative pressure of 0.6 of an inch of water at the base of the stack. With the usual types of horizontal boilers, the loss in pressure through the furnace and passes will be between 0.3 and 0.4 of an inch, and the loss in the breeching and stack connections between 0.05 and 0.1 inch. In figuring the draught intensity for any rate of combustion it is usual to take the pressure in the furnace, directly over the fire, for this is the pressure which is effective in pulling air through the fuel bed, and is independent of variable losses through the setting and boiler passes. The following table gives the pressure over the fire usually carried for various rates of combustion, for different grades of bituminous coals:

	Pounds of Dry Coal Burned per Square Foot of Grate Surface per Hour.						
	15	20	25	30	35	40	45
	Furnace Draught in Inches of Water.						
Semi-bituminous	0.15	0.20	0.28	0.37	0.48	0.60	0.80
Eastern bituminous ...	0.12	0.16	0.20	0.28	0.35	0.45	0.55
Western bituminous...	0.15	0.20	0.25	0.33	0.40	0.50	0.65

(G) Boiler Operation.

The following are the main faults which cause loss of efficiency:

1. Dirty condition of the fire side of heating surfaces due to accumulation of dust, soot or caked carbon and clinker.
2. Scale or sludge deposit on the water side of the heating surfaces.
3. Improper baffling or leaky baffles.
4. Improper furnace design for the coal used.

These four faults and their remedies have already been discussed and need only be mentioned here.

5. Improper distribution of air supply to the fuel bed. This fault is more likely to be encountered in forced draught than in natural draught installations, due to the fact that portions of the fire are subjected not only to the static pressure in the ash pit, but to velocity head, if the air currents from the blowers strike directly on parts of the fuel bed. This can be avoided by inclining the discharge orifices of the blowers slightly downward, or by placing baffle plates in front of them.

6. Improper regulation of air supply to suit fire conditions. Proper regulation can best be obtained by the use of differential draught gauges and gas analysis instruments.

7. Leakage of air into the furnace and gas passages. This fault is one easy to detect and prevent, but often overlooked. Leakage may take place through cracks in the walls, through cleaning doors or openings used for blowers, through front and back doors and openings between headers and vertical riser pipes in water tube boilers, and even through the pores of the brick. Cracks should be patched up, and settings painted or cemented if the walls are thin. Doors and blower holes can be made tight with gaskets or fireclay, and openings in headers can be stopped with magnesia blocks. As already mentioned, air leaks can best be detected by testing with a candle flame. It must be remembered, that when any boilers in a battery are out of service, air may leak through partition walls into the furnaces in operation.

8. Leakage of steam or hot water from safety valves, water column connections or blow-offs. They should be inspected at regular intervals to insure that they do not leak. To prevent accident and keep the fire room free from steam, safety valve outlets are often connected to pipes discharging through the roof. In such cases leakage cannot be so easily detected, and special inspection is necessary. Where blow-off pipes are led separately to the discharge tank leakage can be detected by feeling the pipes. Where they are connected to a common header, leakage is more difficult to detect, as the header would be heated if any blow-off in the battery leaks. In such cases it is good practice to insert a gate valve between the header and the blow-off cock or valve, and on the boiler side of this valve place a tee, with a reduced side outlet fitted with a short piece of pipe and test valve.

9. Wide variation in steam pressure, causing loss by blowing off steam through safety valves. It is advisable to have the safety valves set at least 10 pounds above working pressure, but if full allowable pressure is carried, extreme care in operation is necessary to prevent blowing when a fluctuating load is handled. In a case of this kind it may be desirable to install a damper regulator to shut off the air supply to the furnace when the pressure nearly reaches the blowing point. Operation within very narrow limits is likely to mean loss in economy, and in gas works operation it may sometimes be better to reduce the working pressure several pounds, and maintain a more constant supply of air.

10. Poor feed water regulation. This will be discussed under economy instruments.

11. Loss due to radiation from boiler and furnace walls and from the fire into the ash pit. These losses are usually small, and depend on furnace temperatures, and thickness of walls and their insulating covering.

12. Losses due to sifting of fine coal through the grate or stoker. The amount of this loss depends on the design of the grate, or on its mechanical condition. If excessive, it can usually be remedied by replacing the bars with those having smaller openings, or by changing the grade of coal. It may be due to burned out grate bars, and these must be replaced.

13. Losses due to improper firing of coal and working of the fire. This subject must be discussed at some length, and the general principles of proper fire handling and the firing faults usually encountered will be treated for each variety of coal.

Anthracite Coal.—Only pea coal and buckwheat Nos. 1, 2 and 3 are in general use for boilers, larger sizes being too expensive. These coals generally come in sizes given in the following table:

Size.	Screened Through.	Screened Over.
Pea	$\frac{1}{2}$ inch	$\frac{9}{16}$ inch round.
Buckwheat No. 1 (Buckwheat)	$\frac{9}{16}$ "	$\frac{1}{2}$ "
Buckwheat No. 2 (Rice)	$\frac{1}{2}$ "	$\frac{7}{16}$ "
Buckwheat No. 3 (Barley)	$\frac{7}{16}$ "	$\frac{3}{32}$ "

Meshes all round-punched.

Anthracite coal should be spread in an even thin layer over the entire surface of the fire, doors being fired successively. As it contains little volatile matter, nothing is gained by keeping part of the fire bright, as with bituminous coal. The ratio of grate to heating surface is large, varying from 1.25 to 1.40, so the consumption of coal per square foot of grate is relatively small, but grates are deeper than for other fuels and fires more difficult to work. In order to prevent air holes at the back of the fire it is good practice to give the grate a slight pitch downward from front to back, and make the back of the fire slightly deeper than the front. In cleaning anthracite fires, a light covering of ash should be left on the bars and the new fire built on this. The fire should never be shaken, sliced or disturbed below the surface, except when cleaned, as any disturbance will cause good coal to mix with the ash and form clinker and air holes. The back of a light hoe, or a tee bar, should be made to level the surface of the fire, and this should be done before each charge of fresh coal is thrown on, and the whole fuel bed should show a uniform dazzling white heat before fresh coal is fired. If the fire burns red instead of white, it is usually an indication of insufficient air and the draught should be increased, or the fire cleaned. Anthracite fires are gradually built up, from a new fire thickness of about 4 inches to 8 or 10 inches just before cleaning. As the thickness increases the draught intensity must be increased, and the value of forced draught for this coal can be readily appreciated.

Bituminous and Semi-Bituminous Coals.—Run-of-mine coal should be crushed, or the lumps broken, and no lump larger than a man's fist fired. Lumps tend to form air-holes in the fire, especially with forced draught. Fire doors should be kept open as short a time as possible when coaling or working the fire, and care taken to see that they do not leak when closed. The coal may be fed efficiently by either the coking method or the alternate door method. In the former, coal is thrown on the fire at the front, just beyond the dead plate, the fire being thickest at the front. When using this method, the doors should be fired in succession, the gases distilled from the coal passing back over the hot fire. After the fresh coal has thoroughly coked, it should be pushed back with the hoe and evenly spread over the grate, and a fresh charge put on at the front. This method is sometimes preferred for smokeless operation at moderate capacities, with high volatile coals, when boilers are horizontally baffled, or fitted with extension furnaces, but it is usually less economical than the alternate method, if the latter is properly used.

In the alternate method, coal is fed through alternate doors, spread evenly and lightly over the area of the fire in front of the doors used. For example, with a boiler having four fire doors, the coal is put on through doors Nos. 1 and 3, and this fresh coal allowed to burn to a bright white heat before coal is fed through doors Nos. 2 and 4. In this way the combustion of the gases in each charge of fresh coal is aided by a bright fire or hot brickwork on each side, and a more uniform thickness of fire bed can be maintained with less working of the fire. The great objection to this method is the difficulty of getting the average fireman to use it, as it means additional physical exertion, and some mental effort in selecting the doors to be fired.

The usual and improper method of firing soft coal is that of covering the entire width of the grate at one time and letting the fresh fuel smolder until sufficient air can get through it to burn the gas which has not already passed unburned to the stack. The loss by this method depends on the quantity of coal fed at each firing, and if enough coal is used, the fire is practically banked for several minutes after coal is charged. Frequently fires are coaled only two or three times an hour, the resulting boiler efficiency being about 40 per cent. instead of 70 per cent. With any method of firing, the higher the percentage of volatile in the coal, the smaller the charges should be. The maximum number of shovels of coal allowed at a firing should be fixed, and this should never be exceeded, except when building up a fresh fire, or when boilers are being forced. In the latter case, it is better to shorten the firing interval. The fuel bed should be disturbed as little as possible, the slice bar being used only when absolutely necessary to free the grate from clinker, and then used with a slight lifting motion, not great enough to tear the fire, or allow good fuel to fall into the ash and clinker. Some eastern coals require frequent use of the slice bar to keep the fuel bed open, but most free burning western coals require little. The condition of the ash pit is probably the best indication as to when to use the slice bar or shaking grate. Ash pits should be kept bright all the time, and if they become dull in spots the slice bar should be used. If they are uniformly dull, and remain so after slicing, the fire should be cleaned.

The hoe is a tool intended for use in cleaning fires, but for leveling off the top it should be turned over and used as a rake, the upper surface of the hoe head slicing off the top of the fire. Many firemen use the bottom of a hoe in leveling and in this way chop and tear the fuel bed, defeating the object they are trying to attain. Firemen should be taught the proper use of the hoe, and fires should be leveled whenever holes form or fuel bed is uneven.

The even distribution of air to a fire depends to a large extent on keeping it of a uniform thickness and free from holes, and one fault frequently found in hand firing is that of carrying a very thin fire at the back of the grate. The shorter the grate the easier for the fireman, and often times the men fail to push the fire all the way back to the bridge wall, when leveling. A hole at the back is difficult to detect when looking in a fire door, and may mean considerable loss in efficiency. Side peep holes are recommended where possible to install them, and stack gas analysis will usually help to detect such a fire condition.

Cleaning fires is the hardest part of a fireman's work and therefore apt to be carelessly done. Fires must be thoroughly cleaned, and all clinker which tends to interfere with the air supply through the grates must be removed. Fires must be cleaned as quickly as possible, as the longer the cleaning period, the greater the loss of efficiency after a fresh fire is started, due to cooling off of the brickwork of the setting. Care must be taken to see that careless cleanings do not cause excessive loss of good fuel pulled out with the ash and clinker.

(H) Boiler Efficiency Instruments and Boiler Accessories.

Coal Weighing.—The advantage of knowing exactly how much coal is used during each day's operation, and even the exact amount used by each boiler or by each fireman, can hardly be questioned. Without such it is difficult to determine the daily operating efficiency, and difficult to check waste of fuel or locate other sources of loss. Coal may be either weighed or measured, but the former is more accurate. Where coal is brought to the boilers in barrows or boxes, a platform scale, level with the floor, proves a most satisfactory device. Where coal is dumped from cars within reach of the firemen, it is possible to construct bins or boxes of known capacity, and in this way supply a known quantity of coal during a certain period. If coal is supplied from an overhead bin, it may be measured in the bunker; or in chutes, fitted with upper and lower cut-off grates; by the use of a rotary meter in each chute; or by weighing, either in a traveling hopper, or in stationary hoppers, fitted with automatic recording and dumping devices. Volumetric measurements by any method are likely to be inaccurate for a 24 hour or shorter period. The rotary coal meter has been used with considerable success for small sizes of anthracite, but is unreliable with fuels of irregular size, even crushed run-of-mine or slack. As a rule, accurate daily coal weights, combined with water measurements, will bring about enough increase in boiler efficiency to overbalance any additional labor cost and are recommended, especially in plants of over 500-horse power. If a boiler plant is operated on a premium or competitive basis, care must be taken to prevent incorrect weights being recorded. Incorrect records are worse than none, and it is hardly necessary to say that the majority of firemen are not above making false records if they believe they can benefit themselves.

Feed Water Measurement.—The accurate measurement of feed water is scarcely less important than accurate coal weights. Knowing the coal burned and water evaporated, the evaporation per pound of coal can be obtained, and if the heating value of the coal is known, the commercial efficiency of the plant can be easily calculated and the plant is being continuously tested. Unfortunately most feed water measuring devices are liable to error or mechanical trouble, and can only be successfully operated where they are given special care. Aside from inaccuracies of measuring instruments there are other sources of error in water actually evaporated, leakage through blow offs, leakage in the feed piping in blowing down, and loss and waste of water if boilers prime or foam. The most important of these is due to improper blowing down. Boilers should be blown down at specified intervals, 1 to 2 gauges at each blow, and this wasted water must be measured and accounted for in the record. Firemen can usually be made to realize the importance of keeping accurate rec-

ords or the time of blowing down can be checked by others. An open blow offsump, with a locked valve on the overflow and a water level measuring device, will usually prove a sure preventative of unauthorized blowing.

Water measuring devices may be grouped under general classes:

(a) Meters of the piston, rotary or disc types.
(b) Weighers, or volume measuring machines.
(c) Meters of the venturi type.
(d) Meters of the pitot tube type.
(e) Meters of the weir type.

(a) Are comparatively low in cost, and are easy to install, but are notoriously inaccurate with hot water, especially when subjected to variations in temperature or changes in rate of flow. They are not recommended, as errors as high as 10 per cent. are common.

(b) Are accurate for temperatures up to 210° F. and for all ranges of flow, but are all liable to mechanical troubles from scale and dirty water, and require constant care and attention. They are high in first cost but easily and accurately calibrated in position.

Venturi meters of the indicating type are low in cost but the recorders are expensive and necessary for continuous records. These meters are ordinarily accurate for hot water, over a wide range of flow, but the recording instruments are delicate and require careful adjustment. Their accuracy can be easily proved by comparison with a mercury column which can be made part of the permanent installation. These meters are liable to error if the throat of the tube becomes coated with scale or if the pipes to the recorder become choked. They cannot be depended on for accuracy when there is severe pulsation in feed lines, though this can usually be stopped by air chambers.

Pitot meters have been little used for boiler feed water measurement, but are now being put on the market. Little is known of their accuracy, but they probably have a shorter accurate range than other types. They are low in cost and easy to install, and the recording mechanism is very simple, but it cannot be as easily calibrated as the Venturi meter. There is likely to be trouble due to stopping up of the pressure openings by scale and dirt.

Meters of the V-notch weir type are high in cost, and expensive to install. They are simple in principle and should be accurate through all ranges of flow. The recording device is simple, but so constructed that errors in the meter will be considerably magnified when transferred to the recorder.

In ordering a feed-water measuring device care should be taken to select one large enough to record the maximum rate of flow. It should be remembered that the plant may be operated above rated capacity, and that the feed of water is irregular, and may momentarily be even double that of the average hourly rate. Steam meters are either indicating, recording or integrating. Indicating steam flow meters are of great value on the steam take offs of boilers, but they are of little value for measuring steam consumption, in parts of a plant, except as a means of regulating rate of flow, as to a water gas machine, or for special testing work. The best known type of these is one on the principle of the Pitot tube. By this meter, the actual boiler output in pounds of steam at any instant may be observed, and faults in firing, and even poor heat absorption by a boiler can often be detected. Probably the greatest benefit is in using them to maintain a constant boiler output at as nearly as possible the predetermined point of maximum operating efficiency for a particular boiler. This can readily be done if feed water is supplied at a fairly uniform rate. In some large plants it is the practice to regulate the operation of certain boilers in reference to their output shown by the flow meters, disregarding steam pressures, and use the remaining boilers as pressure regulators. This insures that the majority of the boilers are operated continuously at their most economical load factor, instead of having all the boilers subjected to varying loads.

There are several distinct types of recording and integrating meters:

Displacement meters, which pass the full volume of steam and obtain their records from the movement of a cone valve or disc.

Venturi meters, similar to those used for measurement of air and water.

Orifice meters, which depend on the differential pressure through an orifice of known diameter.

Pitot tube meters, similar to the boiler flow meter, but fitted with a recording mechanism or integrating device.

Measurement of Pressures, Temperatures, Etc.—The instruments for measuring pressures and temperatures are so well known as to need little discussion. It may be well to mention the desirability of installing in every boiler plant a recording gauge for steam pressure and a recording thermometer for feed water temperatures. Such instruments, if calibrated at regular intervals, enable the operating engineer to detect faults in operation during the time he is absent from the plant and will often enable him to check losses. Recording thermometers or pyrometers for stack temperatures are also of value, but are delicate instruments. An indicating pyrometer should be attached to each boiler, as these instruments furnish the most reliable indication of the condition of the heating surfaces.

The differential draught gauge has already been mentioned as of value in the regulation of air supply, and if used intelligently, in connection with a hand flue gas analysis instrument or CO_2 recorder, it will be a most valuable aid as it will show instantaneously any increase or decrease in the thickness of the fuel bed. They are low in cost and easily installed, and if placed where they can be easily seen by the firemen, and the men trained to use them, they are of great value. Natural draught boilers should also have U gauges to show the intensity of draught in their last passes before reaching the breeching.

Flue Gas Analysis.—In careful and systematic flue gas analysis we have the greatest known aid to economic boiler operation. Flue gas samples taken at random are of little practical value, but if they are used in connection with draught and fire condition observations, they show what should be done to improve furnace efficiency.

Continuous CO_2 recorders of many types have been on the market for several years, but have not come into very general use, owing to their high cost and the care required to keep them in operation. They are such complicated and delicate instruments, however, that they cannot be relied upon unless given the most careful attention, and should not be installed unless this fact is well understood.

Instruments for determining the analysis and heating value of fuels are not often found in the operating departments of gas plants as this work is usually done in chemical laboratories. There is, however, a simple instrument for determining the moisture in coals, which should be used in all boiler plants where careful records of operating results are kept.

Feed Water Regulators.—Only the feed water regulator and the damper regulator have a direct bearing on boiler economy. There are many types of feed water regulators, but from an economic standpoint they can be grouped into two general classes; those that so operate the feed valve that it is either wide open or tightly closed, and those that gradually reduce or increase the opening of the valve. Even compared with poor hand feed control, regulators of the first type are of little or no advantage in producing increased economy, though they may be of benefit in maintaining a more constant water level. Regulators of the second type tend towards increased efficiency, though it is doubtful if such increase will ever amount to more than 2 per cent. as compared with hand feed. Steam flow meters and feed water meters of the graphic type have shown the effect on capacity of irregular feeding of water, and, to a limited extent, the effect on economy, and it has been found that with regulators of the positive open or closed type it is practically impossible to keep a constant rate of steam output, the output falling off rapidly when the regulators opens. Steam meters are of little value with this type of regulator, or on boilers fed irregularly by hand, as the output is apparently more quickly affected by irregular feed supply than by furnace conditions. With the other type of regulator and with careful hand feeding, the boiler output can be maintained at almost any desired point. It is possible to improve the feed of regulators of the positive type by auxiliary by-pass valves or by drilling a small hole in the disc of the main regulating valve, in this way maintaining a constant small feed of water to the boiler, and reducing the time of wide opening of the main valve. If this is done, care should be taken to see that the hand operated feed valves are cleaned when a boiler is banked or the load is suddenly reduced, or flooding may result. Feed water regulators can usually be installed with advantage, but the throttling type of regulator is to be preferred.

Damper Regulators.—Damper regulators are of undoubted advantage for pressure control with fluctuating loads, but they usually have little economic value, if the fireroom force can be trained to use intelligent hand regulation. The principle of damper regulators is wrong from an economic standpoint, as they regulate the supply of air in accordance with the steam demand, while to produce the best furnace conditions it should be regulated to suit the condition of the fire. Nearly all small electric stations use damper regulators, as they are subject to sudden load fluctuations, and pressures must be

maintained within a few pounds of the standard. In gas works a fluctuation of 5 or even 10 pounds is not a vital matter, and a good fireroom force can usually control pressures with hand regulation, and without ever completely shutting off the air supply. All modern regulators use a partial stroke, gradually opening or closing the damper, and in this way gradually increasing or decreasing the air supply and resulting rate of combustion in the boiler furnaces, instead of opening wide or closing off entirely, as did some of the older regulators.

(To be Continued.)

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, February 10, 1914.

The Half-Years Accounts.—Labor Troubles.—Gas Fires and Ventilation.—Monazite and Thoria.

The Accounts for Gas Undertakings for the half year ended December 31st, 1913, as issued, punctuate the remarks on the trend of events in 1913 that formed the commencement of my last letter. The chief trouble is the high price of coal, coupled with the fact that the quality of the material is not improved with the rise of price. Rather the reverse. During the second half of 1912, many gas undertakings were able to assist this item by means of arrears of previous contracts, which somewhat mitigated the effects of the advance in June, 1912. This year there has been no corresponding advantage, so that the advance of 1s. 6d. per ton in June, 1913, works out to more like 2s. Then there has been an unusually mild and light autumn, the fogs and dark afternoons of November conspicuous by their absence. This has affected the demand for gas, and also the coke market, giving rise to the anomalous position of cheap coke coincident with dear coal. The Gas Light & Coke Co., of London, find their coal bill increased by something like £60,000, as compared with 1912, with receipts for coke £10,000 less. The corresponding items for the South Metropolitan Gas Co. are £71,000 and £8,000. Expressed as percentages, the Gas Light & Coke Co. have had to pay 7½ per cent. more for coal, and have received 2½ per cent. less for coke. The South Metropolitan coal bill has advanced 6½ per cent., and the coke sales decreased 4 per cent., and this is a fair index of the position throughout the country.

The report from the Directors of the South Metropolitan Gas Company is remarkable in respect to two items. The first is the expression of opinion to the effect that the high home price for coal is brought about by a large increase in exports, and recommends the establishment of an export duty as a remedy. The second is in the interesting announcement that the nickel process for reducing sulphur compounds other than sulphureted hydrogen (to which I have already referred) has proved so satisfactory that it will be applied to the whole of the gas supplied by the Company, and that, at no distant date, sulphur will be completely eliminated. No one will deny the desirability of keeping down the sulphur compounds, if it can be done by a process that does not increase nuisance at the gas works, and after such a favorable comment, we may expect to hear more about this process elsewhere.

There has been some inconvenience in London during the recent cold weather, by reason of a strike of coal porters and carmen in the employ of coal merchants, which is, no doubt, part of the programme of labor agitation being carried on in various ways. As at Leeds and elsewhere, the public were not slow in showing that they had no sympathy with the strikers, and many of them proceeded, in one way and another, to fetch their own coal. A more suicidal policy in the interest of labor could scarcely be devised, because there is no practical difficulty in filling sacks and loading them on lorries entirely by machinery, and the general adoption of steam or electric motors would largely reduce the number of hands required. In many cases, the problem of unloading into the cellar, or storehouse, would not present insuperable difficulties. Every sign of unreliability on the part of labor at critical times, is a direct incentive to the introduction of machinery. This has been the case in gas works, and it is by no means the only instance of the labor agitator preparing the way for the coming of the iron man. Our interest in this dispute is due to the fact that it has shown the public faith in gas companies. On this point the *Times* remarks that, as usual, it is people of the strikers' own class who have suffered most by the strike, but that to some extent their hardships have been mitigated by resort to the gas companies coke yards, where hundreds of tons of coke have been supplied in 28-pound paper bags, and middle class customers have met the situation by a more extended use of gas fires. The strike has been too short to cause any marked increase in the purchase of these useful articles, but the fear that such a policy would be largely adopted, and permanent injury done to the trade as a result, has been continually in the minds of coal merchants. This comment, from an independent source, is a striking example of the facts that the gas fire, and the gas cooker, are generally known and appreciated. Others besides the coal merchants are aware of the great improvements that have been made in the gas fire.

In one respect these are not unmixed blessings to gas companies who have supplied large quantities of gas fires on rental. Advance has been so rapid that gas fires made as recently as 1905 or 1906 are practically obsolete. Customers who hired fires seven years ago, on calling at the gas company's showroom, and seeing the display of the latest make (a characteristic of which is that not only has the efficiency been greatly improved, but the selling price reduced 30 to 50 per cent.) decide to buy one, and return the hired fire. The consequence is that many undertakings find themselves with a large stock of the old pattern on hand, for which there is no possible outlet. This is one of the risks and disadvantage of letting goods on hire. Lady customers often remark that they prefer to have gas appliances on hire because, if at any time they see something that pleases them better, they can send back the hired article, whereas if they buy, they would have to keep it until it was worn out, or be actual losers. In these rapidly advancing times the possibility of the appliance becoming obsolete before it is paid for, is not to be overlooked by those who let apparatus to hire. An important feature is that the modern gas fire can be adapted to any ordinary chimney or flue, so that the whole of the products of combustion are removed from the apartment, which at an earlier period was not the case. There was no special practical difficulty in securing such a result, but there was an impression that the escape of a moderate amount of products was no objection, and that it tended to economy of gas. The hourly rate of consumption was at that time a drawback, and it was admitted that the gas fire was somewhat costly if used, say for ten hours daily, and in practice it was largely confined to intermittent use, such as for a study or library that was only occasionally occupied, or offices, laboratories and other apartments, where it was an advantage to lock up when required, and be independent of servants going in to attend the fire. Where a large number of private papers or valuable apparatus, specimens, etc., were spread about the tables, the advantage is obvious. But, with regard to general home use, the medical profession were not slow to perceive the presence of carbon dioxide, and possibly products of incomplete combustion, or the characteristic odor of hot air in contact with hot metal, with the result that they forbade the use of gas fires in bedrooms and sitting rooms, and the effect of such a veto led to a general impression that a gas fire was unwholesome or undesirable for any purpose. By improved construction, chiefly directed towards the securing of a larger proportion of the total as radiant heat, there is no difficulty as far as the gas bills are concerned. And many medical practitioners, being satisfied that the products of combustion are completely removed, appreciate the advantage of an even and accurately adjusted temperature, and are recommending their use. With a coal fire considerable skill and frequent attention are required to maintain anything like an even temperature. The coal must be put on in spoonfuls every few minutes. The general plan is to put on a liberal supply of fuel sufficient to last two or three hours, with the result that there is not sufficient warmth while the cold stuff is heating up, too much while it is on full blast, and again a slack period while the fire is burning low, or while the next supply of fuel is heating up. These variations are particularly marked if a free burning, gassy fuel is used. With a gas fire the temperature is absolutely even.

As illustrating the interest taken by the medical profession in this subject, reference may be made to an article on the "hygienic testing of gas fires by a physical, and by a chemical method," that appears in the *Lancet*. The physical method is the shadowgraph, introduced by the Davis Gas Stove Company, which I have already described. Of this, the *Lancet* says "it has been carefully examined by well known scientific authorities, and apparently it is open to no fallacy, although it may have limitations." It is rather remarkable, by the way, to find a scientific test introduced by a manufacturing firm, and meeting the approval of academic authorities, who are rather apt to despise the science of practical men. The chemical test is a method of making the escaping products visible, and has been devised by Mr. S. A. Vasey, director of the *Lancet* laboratory. It is based on the well known fact that when fumes of hydrogen chloride, even in minute quantity, come into contact with fumes of ammonia, dense white clouds of ammonium chloride vapor are produced. The air supply of the fire being charged with a slight quantity of some substance that will produce the acid fumes, a small test tube charged with strong amonia solution is passed along the edge of the canopy, or other part of the apparatus where the escape of fumes may be expected, when the presence of such is instantly evidenced by the appearance of the white vapors. A suitable substance for the purpose is chloroform, or carbon tetrachloride, and after several experiments as to the best way of introducing the small quantity required, it was found that the most convenient plan was to soak small blocks of chalk in the liquid, wipe them dry, and place the blocks near the air inlet, the chalk acting simply as a suitable absorbent material. This chemical method appears to be well adapted for practical purposes, as the whole equipment can be carried in a small box, and it is so simple in application as to be within the capabilities of any man competent to fix a gas fire. The adoption of the tetrachloride method would go far towards removing many of the difficulties that in the past have led to the rejection of gas fires, and created a prejudice against them. It is easy to be assured that the chemicals are in proper order by partly closing the outlet to a sufficient degree to cause the white fumes to appear.

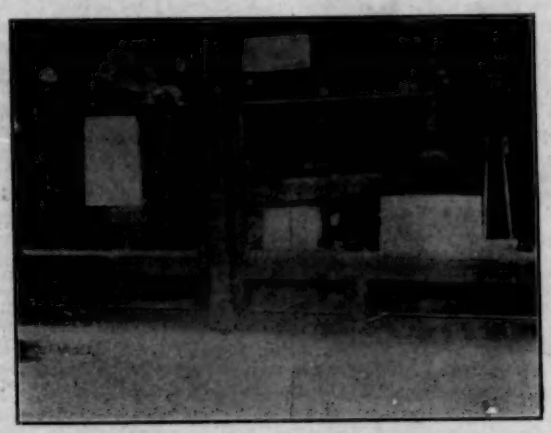
Monazite and thoria have been prominently in evidence before the Society of Chemical Industry. A few days since a paper was read before the London Section by Mr. S. J. Johnstone, B.Sc., dealing with the source and composition of this mineral, and giving special attention to some new sources. The deposits in Brazil are said to yield over 6,000 metric tons of 90 per cent. monazite per annum, containing 4 to 7 per cent. of thoria. An important contribution to the

world's production of monazite has been developed during the last 2 years at Travancore in India. The output in 1911 was 811 tons, 1912, 1,135 tons, and the thoria content is 8½ to 10 per cent. A monazite of similar quality has also been found in Ceylon, and specimens have been obtained that run as high as 28 per cent. Monazite of variable quality has also been obtained from Malay, Nyassaland, Nigeria, Virginia, North Carolina and Quebec, the Virginian product yielding over 14 per cent. thoria, and that from Quebec 12 per cent. Considerable variation in yield is found as regards the supply from different parts of the same locality. A commercial difficulty is the large proportion of waste products, for which, with the exception of a limited output of cerium, there is at present no demand. This is especially a difficulty if the monazite had to be conveyed a long distance before treatment. It is evident that the supply of this important mineral is more general than was at one time supposed, and that a thorium corner is now impracticable.

In a lecture delivered before the Liverpool section of the same Society, Professor Fritz Haber had considerable to say about thoria and the mantle, but his remarks are not of sufficient general interest to call for more than a passing reference. His account of the abstraction of the radio active substances from monazite is particularly interesting to chemists and medical men. In 1,000 tons of monazite there are a few grains of "mesothorium," the value of which, in the concentrated form, is stated to be greater than that of the original material. The Professor's references to the action of an incandescent mantle in a flame are also interesting, and it is evident that the general notions about high flame temperature, heat concentrated in a small area, etc., are purely imaginary.

New Methods and Appliances.

EDUCATIONAL WINDOW DISPLAY.—The People's Light Company, operating electric, gas and steam-heating properties at Davenport, Ia., recently made use of a window display intended to be of educational interest to the Company's patrons in any branch of its service. Electrical energy taken through a meter mounted in the window



drove a small reciprocating air-lift pump, the air intake for the pump being through a gas meter. The air was then used to lift the water through the piping shown in the illustration and through the steam meter at the left. Thus the three meters—one registering electrical energy consumed by the motor, the gas meter registering air taken through the air-lift pump, and the steam meter registering water—were shown in operation before the eyes of the public. Glass tubing used instead of pipe showed the travel of the water and placards explained the other operations. Disassembled meters were shown on the floor of the window.

TESTS OF LINESHAFT BEARINGS.—Results of tests on three types of lineshaft bearings are contained in a paper read before the American Society of Mechanical Engineers, by Carl C. Thomas, Professor of Mechanical Engineering, University of Wisconsin. It reports experimental determinations of the absolute and relative amounts of power required to drive specially constructed shafts, carrying uniformly distributed loads, and supported by ringoiled babbitt, roller, and ball bearings. A wide range of loads and speeds was covered and the coefficients of friction worked out for each type. It was found that the power required for babbitt bearings was higher than for the others, except perhaps at low loads and speeds, and that the power for roller bearings was higher than for the ball type. The excess of power required by babbitt over roller and by the latter type over ball bearings increases with an increase of speed for all loads. The relative amounts of power consumed in friction are given in the accompanying table. They are based on the average power for approximate loads of 730, 1,230 and 1,730 pounds on the bearings.

Relative Amounts of Power Consumed in Friction.

	100 Ft. Per Min.		300 Ft. Per Min.	
Bearings.	77 Deg.	100 Deg.	77 Deg.	100 Deg.
Ball.....	1	1	1	1
Roller.....	2.2	2.5	2.7	3
Babbitt.....	3	3.6	4.5	4

Items of Interest
FROM VARIOUS LOCALITIES.

THE City Commissioners, of Birmingham, Ala., having in 1913 abolished the office of inspector of gas and water meters, recently decided to make a pretense of again maintaining such city official, having instructed City Smoke Inspector Taylor to look after the meters as well as to keep down the smoke. This should keep him busy.

MR. CHARLES B. KELSEY, who was President of the American Public Utilities Company, is now Chairman of the Board, a substitution asked for by him to enable him to give more time to the work of the Grand Rapids (Mich.) Association of Commerce, of which body he was recently elected President. As before noted in the JOURNAL, Mr. Joseph H. Brewer, formerly Vice-President and General Manager of the Utilities, succeeds Mr. Kelsey as President of the Corporation.

THE electric current supply of Winsted, Conn., was shut off for some hours during the stormy times of Feb. 17th. The disturbance or interregnum was caused by a rat becoming mixed-up in the terminal tumblers, in the switchboard of the Robertsville station of the local gas company.

"THE Brockton (Mass.) Gas Light Company's Employees' Association dedicated the new headquarters on Center street, one evening not long ago. A banquet was the opening number, and Frank Michelini prepared it in the best possible style. Supt. Morrison, at the instigation of Jem. Moran, addressed the members, the burden of his well-told speech being in line with the pleasure it gave him to note the harmony that prevailed amongst the Company's workers. The Association Quartette (D. J. Buckley, Henry Owens, J. P. Moran and 'the only' Neafsey) treated with some fine musical selections, not the least of which was a tenor solo by 'the only.' To show the versatility of the membership let me instance: E. B. Mooney sang 'The Blue Bells of Scotland,'' and 'The Harp that Once Through Tara's Hall;' 'Ed.' Jordan, clogged it in clattering style; 'Will.' Hayes' work on the harmonica was only equaled by John Prendergast's flourishes on the jew's-harp, and that wizard at the keys evolved melodious tones from the new piano, just 'bought and paid for.' The affair was under the general supervision of Chairman John Wise."

MESSRS. KELSEY, Brewer & Company, operators, the American Public Utilities Company, Grand Rapids, Mich., announce that they have closed negotiations by virtue of which they now practically control all the public utilities rights in the Mississippi Valley, between La Crosse, Wis., and St. Paul, Minn. This gives them an outlet at the Twin Cities for the great capacity of the Mississippi Valley between the named cities, which territory is experiencing rapid growth, of the stable sort.

MR. SAMUEL B. GRIFFITH, for many years in the employ of the U. G. I. Company (in fact he was one of the earliest on its payroll), died in his home, 440 South 57th street, Philadelphia, the morning of February 12th. He was in his 74th year, and is survived by his wife and one son.

THE Westfield (Mass.) municipal gas plant reports the sale ahead of all the coke it sees fit to deliver up to March 31st. The price is $4 per net ton in the yards.

MR. V. C. SEVERANCE, President of the Suburban Gas Company, of Asco, Fla., a model modern industrial town on the Seaboard Air Line Railway, perhaps 10 miles north of Jacksonville, Fla., is said to be in the market for a gas plant. It is further said that he is undecided as to the type of plant to be installed.

MR. GEORGE D. ROPER, President, the Eclipse Gas Stove Company, Rockford, Ills., accompanied by his wife and Mr. H. C. Aiken, Eastern representative of the Company, arrived in Rio de Janeiro, February 26th. Their itinerary includes visits to Buenos Aires and Valparaiso, possibly to Lima. They are booked to arrive in New York about mid-April.

RUMOR has it that there is likelihood of Mr. C. B. Strohn, Manager of the Elgin (Ills.) district of the Western United Gas and Electric Company, being appointed General Manager of the Company's coke subsidiary, with headquarters in Chicago.

THE proposed extension of the mains of the Westchester (N. Y.) Gas Company to and through the streets of Nepera Park (a suburban district of Yonkers), will be an accomplished fact this spring.

THE most successful conference of the engineers and managers in in the service of the W. E. Moss Company, was that held some days ago in Hannibal, Mo. The host was Mr. F. A. Tippy, Manager of the Citizens Company, of Hannibal, and the proceedings comprised business sessions, an inspection of the local lighting plants, a banquet and general sight-seeing. Amongst those present were: W. E. Moss, Secretary-Treasurer; B. O. Tippy, the Company's clever Supervising Engineer; D. A. Barnes, L. G. Adams, D. J. Kull, Glenn R. Davis, C. W. Wright, Robert Wiseman, George Turner and F. A. Tippy.

THE National Tube Company, Pittsburgh, Pa., was responsible in this city for three lectures, of the film illustrated nature, respecting the manufacture of iron pipe, "from ore to the finished product." The first lectures (two) were delivered and shown in the Vocational Trade Schools, February 24th and 26th; the third before the New York Society of Gas Engineers, February 26th. The subject matter was quite similar to that presented to the New England Association of Gas Engineers, at its last annual meeting, and the lectures were delivered before large and appreciative audiences.

"B. L. B.," sends this from Lynn, Mass., under date of the 24th inst.: "Rather unique was the 'baking bee' successfully illustrated in the show rooms of the Lynn Gas and Electric Company, the last 3 days of last week. The show was for the benefit of the missions' work of the Central Congregational Church. Cooking all sorts of foods was illustrated by experts, assisted by the church women. 'Automatic' flour was used, and the milk came from and by the courtesy of the Oaklandvale farm. Biscuits, doughnuts, cake and candy were on sale during the open time (from 11 A.M. to 6 P.M.) of the day, and coffee and rolls were also served. Mrs. C. Thurston Chase was the Chairwoman of the undertaking."

AT the annual meeting of the Sodus (N. Y.) Gas and Electric Light Company the Directors chosen were: Messrs. A. E. Larkin, C. W. Mills, Thomas Munro, G. R. Mills, and W. W. Nichols. The Directors in turn elected the following executives: President, C. W. Mills; Vice-President, Thos. Munro; Treasurer, Dr. A. E. Larkin; General Manager, G. R. Mills.

AT the annual meeting of the Laclede Gas Company, St. Louis, Mo., Messrs. F. O. Watts, W. C. McBride and E. A. Faust, were chosen to succeed Messrs. W. R. Bixby, Alonzo Potter and August A. Busch; the other 10 retiring members were chosen to succeed themselves.

WE understand that negotiations have been completed whereby the Gas Light Company, of Augusta, Ga., has been acquired by the Southern Gas and Electric Corporation, of Baltimore and Richmond. In the transaction Messrs. J. C. M. Lucas, Dwight F. Mallory and associates, turn over the property to the Southern Gas and Electric Corporation, which concern a short while ago attempted to lease the municipal gas plant at Richmond. In fact, the proposition is still pending. The transaction represented a round $1,000,000 transfer. The Augusta Company operates under irrepealable legislative franchises and supplies all the gas used in Augusta and Somerville. Mr. J. C. M. Lucas, a Baltimorian, who retires as President of the Company, is succeeded by Mr. L. J. Pollitt, another Baltimorean, and a Vice-President of the Southern Gas and Electric Corporation. The new Board of Directors of the Augusta Company is thus constituted: F. L. Homer, J. C. M. Lucas, L. I. Pollitt, Paul C. Moore and Dwight F. Mallory.

AT the instance of Councilman-at-Large Mulholland, the Council of Toledo, O., is considering the advisability of instituting a Bureau of Inspection in regard to the reliability of gas and electric meters, on any and all accounts.

"B. M. M.," sends this from Eugene, Ore., under date of the 20th February: "Hinting at a plan to distribute gas to all towns within 25 miles of Eugene, and announcing a determination to bring the output of gas nearer to the capacity of the Eugene plant. In any event, Mr. A. Norman, Vice-President and General Manager of the Oregon Power Company, has announced a reduction in gas rates for Eugene and Springfield averaging 29.6 per cent. The new rate, Mr. Norman says, will be lower than that of any other town of even twice the size of Eugene west of the Rocky Mountains. The customers of Eugene and Springfield are now using approximately 3,000,000 cubic feet of gas each month, but it is Mr. Norman's hope to increase this output up to the capacity of the plant, which is 15,000,000 cubic feet. The greater reduction has been made on rates for large quantities with a view to increasing the use of gas on account of heating. The former base rate was $1.50 per 1,000. The new rate is $1.10.

"O," WRITING under date of the 23d ult., forwards the following: "The third monthly meeting of 'The Gas Meeters,' Milwaukee Section, was held in the Hotel Martin, the evening of Saturday, Feb. 21st. About 40 members enjoyed a beefsteak dinner, to the accompaniment of unbounded good fellowship, for which the organization not only stands but also demonstrates. A listing of the entertainers would really have to include everyone present. Chairman C. H. Wiggers had excellent aides in the persons of Toastmaster Jasperson, Secretary Hoffman, and Chairman of-Everything-Else, J. H. Walker. Amongst the out-of-town guests were Mr. Thurston Owens, General Secretary and Treasurer, of The Gas Meeters, and Messrs. C. C. Dunkle and W. W. Wallace of Chicago.

MAYOR R. A. Hennig, of Brainerd, Minn., has reaffirmed his reason for vetoing the proposed gas franchise to Mr. A. G. Whitney and associates, under which they were to construct a gas plant in Brainerd. He declares that the settlement should have such a plant, and avers that he has no reason or cause to believe that the Whitney associates were acting in other than good faith. His objections are grounded solely in the belief that the plant should be built by the municipality and operated on public account.

THE Didier-March Company, of Perth Amboy, N. J., will construct for the Springfield, Mass., Gas Light Company, north and south extensions to its retort house plant, each wing to have the dimensions of 47 feet by 46 feet 8 inches, and 70 feet in height. The structure will be of brick and steel. The same contractors will also construct for the Springfield Company a tar tank 30 feet by 12 feet.

MR. FREDERICK GARDELLA has been appointed Assistant Superintendent of the Suburban (Mass.) Gas and Electric Light Company, of Revere. Mr. Gardella is a graduate of the Chelsea (Mass.) High School and has been in the employ of the Company for some time.

"SANCHEZ," writing from Tampa, Fla., under date of the 22d of Feb., says: "There cannot be any doubt about it (and my own people are fairly large users of their product) that the Tampa Gas Company is now a thoroughly live institution, and is rendering us service of excellent sort. And that its proprietors have faith in Tampa is being emphasized from day to day. The latest evidence in this last respect is to hand in the purchase, from Mr. A. J. Knight, of the whole block, bounded by the Hillsborough river, Constant, Cuba and Lozano streets, on which it is proposed to erect a large warehouse, work on which will be soon started. The present warehouse, which is in Ybor City, close to the plant, is disadvantageous, in that it means long wagon hauls to carry the appliances to all sections of Tampa proper. The recently purchased site is virtually in the geographical center of the city."

"C. M. H.," writing from Glassboro, N. J., forwards this under date of February 24th; "Last Saturday a farewell reception and supper were tendered Supt. L. A. Gosnell, of the New Jersey Gas Company (he leaves for San Francisco the 26th) by the employees of the Company, the scene of the happening being the home of Frank Miers, on Zane street. A splendid time was had. Mr. Gosnell was presented with a beautiful signet ring by his men, the presentation speech being very happily made by Mr. Walter Dunham. And Mr. Gosnell's acceptance was such as one would expect from a man of his sterling ways. Guests were present from Vineland, Pitman, Laurel Springs, Pennsgrove and Bridgeton."

MESSRS. J. R. ANDERSON (of Oakdale, Cal.), and L. W. Le Baron are planning to build and operate a gas plant in Riverbank, Cal. In fact, they assert that, with the consent of the State Railroad Commission, they will be in readiness to operate by June first.

"B. L. G.," writing from New Bedford, Mass., under date of February 25th, says: "I thought you would care to near of the death of Mr. Hartley H. Pollard, so proper mention on the record might be made. Deceased was born in Macclesfield, England, March 26, 1849, and came to America in 1880, settling in New Bedford. In that year he became a member of the force of the present New Bedford Gas and Edison Light Company, and served it usefully ever since. His death (February 13th, last), was the sequel of a short illness. He was a prominent member of the Pride of New Brunswick Lodge, I.O.O.F., Manchester Unity, of which organization he had been President, also Secretary. He is survived by a daughter (Mrs. Ethel Taylor) and his second wife, nee Mrs. Annie Lancaster."

Utilities Commission News.

ALLOWS COMPETING COMPANY.—The Board of Public Utility Commissioners of New Jersey has granted the application of the Phillipsburg, Light, Heat and Power Company for permission to operate at Phillipsburg, which territory is now served by the Eastern Pennsylvania Power Company of New Jersey. In approving a franchise to a competing company the board emphasizes the fact that any company furnishing inadequate or improper service will not be protected in the territory it serves, holding that the Eastern Pennsylvania did not furnish proper service. The Board also notes its objection to an ordinance which requires a company to furnish certain public service without charge, and is not satisfied that it has not the power to rescind such conditions should such be shown to be unjust and unreasonable. In this case the Board, while not eliminating such provisions from the franchise, places the town on record as to taking the risk of their possible annulment by the courts or later by the Board.

GAS RATES REDUCED.—In the complaint of the City of Ontario, Cal., vs. Ontario-Upland Gas Co., the present rate, $1.75 per 1,000, was held unreasonable and unjust, and a $1.25 established, with monthly minimum 50 cents. Capital of the Company is $100,000, in $1 shares, of which 38,995 shares brought in only $32,000 cash, this including 25,000 shares bonus stock to the promotor in addition to 42,466 shares allowed him at 50 cents. The difference between par and cash received for this stock was carried on the books at $56,995, "cost of franchise." The value of plant was $68,259.93, the Commission's engineering department estimating cost of reproduction $64,931, present value $54,772. Total earnings, 1912, were $28,854.93; and operating expenses, $12,460.27, exclusive of taxes. Estimated operating cost for 1913 was 77.55 cents per 1,000, not including taxes, and with 3 per cent. for depreciation. The Commission considers a $1.25 rate "will be sufficient to provide, on a very liberal basis, for all operating expenses, in addition to allowing 3 per cent. for depreciation and 8 per cent. interest on the book value of the physical property, as contended for by the defendant, or a total allowance for interest and depreciation of 11.7 per cent. on the reproduction value of operative physical property as estimated by the Commission. While this is undoubtedly liberal, we believe that under all the circumstances such liberality is justified."

N. C. F. MODEL PUBLIC UTILITY LAW.—The various steps taken in the compilation of the model public utility bill of the National Civic Federation were outlined by Mr. Emerson McMillin in a report as chairman of the committee having this in charge at the meeting of the Federation on December 11. Under the provision of the proposed model bill, the Commission may investigate and fix absolute rates and prescribe absolute standards of service and require adherence thereto as well as to a uniform accounting system of the Commission's determination. The bill provides for a single state commission to have control of all utilities within the State. It protects existing investment from competition except when proven necessary to provide adequate service at reasonable rates. Municipalities owning public utilities are required to keep uniform accounts prescribed by the Commission and to report to the Commission exactly like private companies.

UTILITY SHOULD PAY FOR EXTENSION.—The California Commission says: "It should be distinctly understood that this Commission does not approve the apparently growing tendency on the part of public utilities to refuse to make extensions unless the proposed customer pays for the extension. A very usual arrangement to which this Commission's attention is being frequently directed, is an arrangement by which the consumer pays for the cost of the extension and is reimbursed in the amount of 20 per cent. or some similar amount, of his bill month by month. Ordinarily, this Commission will not approve of such an arrangement. Unless an exceptional case is presented, the Commission will adhere to the general principle to the effect that it is the duty of a public utility to build at its own expense all extensions which are necessary to serve persons residing in territory which the company, either by direct assertion or by necessary inference, holds itself out as ready to serve.

The Market FOR GAS SECURITIES.

One and one-quarter points off in the bid for Consolidated is the record at the close of the week—Friday. The actual quotation this morning is 133 to 135. This seeming weakness is altogether attributable to the uncanny state of mind of the speculators who make the figures for the general market. The demand for bonds continues. One sale yesterday (Thursday) on the Exchange was $3,000 New York Gas, Electric Light, Heat and Power 4's, at 84⅛, or ⅛ up from last recorded transaction.

Brooklyn Union sold yesterday at 126. This Company's regular quarterly of 1½ per cent. was declared the 19th ult. Last quarter an extra of 1 was declared, and next quarter it is reasonable to assert a like extra will go. The extra 2 per annum is to return to shareholders the income withheld in 1906-07. That shrinkage amounted to 9½ per cent., of which 5 per cent. has been made up. The Company's position in every respect betters from day-to-day.

The Laclede Company's position is improving all the while. The regular quarterly of 1½ on the common is payable the 16th March, the books being ordered closed between February 28th and March 17th.

Peoples, of Chicago, shows no change, although it continues unaccountably weak, at 121 to 122. However, investors will have cause for regret over their failure to take advantage of the present opportunity. The influences making for values in these shares are of the very best nature.

Baltimore Consolidated is 106, and no difficulty whatever was experienced in marketing its refunding bond issue, in so far as the initial offering of the substitute security is concerned. The recent sharp rise in Montreal Light, Heat and Power is well sustained. Pacific Gas and Electric is a bit weaker, at 44 to 44½, and U. G. I. remains as before. American Gas looks low at 101 to 101½.

GAS STOCKS.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MARCH 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	133	133⅝
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	8,500,000	1,000	101	108
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	101	104
Mutual Gas Co.	8,500,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	59	62
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100¼
New York and East River—				
1st 5's, due 1944, J. & J.	8,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	96	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	90	95
The Brooklyn Union	15,000,000	1,000	125	126½
1st Con. 5's, due 1948, M. & N.	15,000,000	—	103	103
Yonkers	299,650	500	180	—
Out-of-Town Companies.				
Capital, Sacramento	800,000	50	—	85
Bonds (6's)	180,000	1,000	—	—
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Chicago Gas Co. Guaranteed				
Gold Bonds	7,000,000	1,000	104	106¼
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	8,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore				
City, 4½	2,751,000		—	—
Cincinnati Gas and Electric				
Co.	29,500,000	100	67	69
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	96	98
Columbus Gas Light & Fuel				
Company	1,682,750	100	65¾	66¼
Preferred	3,026,500	100	33	35¾
Detroit Gas Co., 5's	881,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100¼
Equitable Gas & Fuel Co.,				
Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co.,				
1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Laclede Gas Co., St. Louis.	10,000,000	100	98	101
Preferred	2,500,000	100	—	102¼
Bonds	10,000,000	1,000	102¾	103
Massachusetts Gas Companies, of Boston	25,000,000	100	93	93⅜
Preferred	25,000,000	100	93	93⅜
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	103	
Montreal L. H. & P., Canada	9,000,000	100	228	230
Peoples Gas Lt. & Coke Co.,				
Chicago	25,000,000	100	121⅜	122
1st Mortgage	20,100,000	1,000	102	102¼
2d "	2,500,000	1,000	104	—
Pacific Gas and Electric Co.	15,500,000	—	44	44⅜
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
United Gas Imp. Co.	55,502,930	50	168	171
Washington (D. C.) Gas Co.	1,600,000	200	440	442
Western Gas Co., Milwaukee	4,000,000	—	—	—